

# AVIATION WEEK

JUNE 20, 1955

50 CENTS

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## Domestic

McDonnell Aircraft Corp. last week received a \$100 million plus preliminary contract from USAF for production of F-101A long range fighter.

Lockheed Aircraft Corp.'s Georgia Division signed the first development contract awarded by USAF. The \$77 million agreement, for production of turbo-prop C-130 combat cargo transports and spares, gives the Air Force full advantage of a contract between private companies.

North American Aviation established a separate Nuclear Engineering & Manufacturing Division in an expansion of research and development for all types of nuclear aircraft. Vice president in charge of the new division Dr. Chatterjee Saha.

First all-weather aircraft, an F-50C built by East Coast Aircraft for USAF's Air Research and Development Command, will undergo extensive tests at Wright Patterson AFB. Results will help USAF in its plans for possible substitution of components for all-weather in standard all-weather material. The experimental aircraft made its first flight June 13 at Wright AFB.

Caswell Aeronautical Laboratory will complete a record high of \$12 million in research and development June 30, the end of its current fiscal year. The expected funds, new contract proposals and activities in coming months will amount a fiscal 1956 total of \$12.8 million.

Consolidated Aircraft Co., Wichita, announced its selected C-119 helicopter has won certification by Civil Aeronautics Administration. Performance characteristics certified by CAA include maximum speed of 132 mph, climbing ability from sea level to 18,000 ft in 7 min 38 sec, and a hovering ceiling of more than 15,000 ft; the four-place chopper is powered by a 268 hp. Continental P-50-770 engine.

Aluminum overhauls struck against Flying Tiger Line last week in an effort to win wage increases and a union shop.

Boeing Aircraft signed a 33 year agreement with the Dallas municipal government for lease and construction of a new 54-million dollar base at Love Field.

New plastic canopy, developed

## NEWS DIGEST



## Fiat Unveils F-86K Caccia

First view of Fiat F-86K Caccia, Italian version of North American Aviation's Sabre, built for North Atlantic Treaty Organization, the F-86K carries Italian markings and is the country's first all-weather jet fighter. It is armed with four 20-mm cannons instead of rockets carried on USAF's F-86D Sabre. Tail logo is for a banking team, now being installed on North American Sabres under USAF retrofit program.

by Boeing Industries Corp., was approved for Navy and USAF aircraft. The armor protects against fire and small arms fire and is a quarter the weight of equivalent metal armorplate protection.

Flattner Aviation Corp. is making first deliveries to Grumman Aircraft Engineering Corp. of an undelivered number of external fuel tanks ordered for F-105C Mustang. Total value of the fuel tank order, \$1,511,641.

Martin PGM SeaMaster, Navy's jet powered missile, is scheduled to make first flight each this week from China Lake, near Baltimore, Md.

North American Aviation has renewed negotiations with the Austrian government to set up an international fig. airline which would provide Vienna-New York, trans-Atlantic service as well as intra-Europe services. J. B. Lewis, president of the non-subsidized group, and the Austrian firm is to operate air coach exclusively with DC-8B and DC-4 equipment.

Mr. Gen. John B. Montgomery, who resigned from the Air Force last month as commander of the 5th Air Force, Strategic Air Command, has been named assistant vice president-operations for American Airlines.

Pan American World Airways is marketing 24 turboprops to help develop Turkey's airline industry under a three-year U. S. aviation technical assistance project for which the U. S.

is contributing \$1.6 million and Turkey is investing about \$500,000.

## Financial

Kaman Aircraft Corp. declared a 10-cent dividend for the second quarter of 1955, payable July 15 to Class A and B stockholders of record June 30.

## International

A. V. Roe Canada offered to purchase of outstanding Class A and common stock of Canadian Car & Foundry Ltd. for about \$22,213,480. CCF now is building Bombs T-34 training and produced Hurricane fighters and other aircraft during World War II. The company also makes railway cars, street cars, buses, mining equipment and other things.

Two prototype SO-9090, interceptor version of Stearman SO-9000 Trident, are expected to make their first test flights in the near future. SO-9000 is a two-place aircraft built on an aircraft SO-9010 wing using two of its three rotors.

Adcock Aviation Louis Bergart will build five pre-production Republic 105B for the French Navy. The carrier-based anti-submarine aircraft, a modified and lighter version of the Republic 960 Ventura, eventually will replace Grumman TBM Avengers now used by the French Navy. Powered by a Rolls Royce Dart RD1A 7 turboprop engine, the four-place 3150 sq ft patrol for four hours at 273 mph.

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## COLONIAL BREAKS WORLD'S RECORD WITH AIRWORK ENGINES



Colonial Airlines remarkable record of over 25 years operation without a fatality or a serious injury gives us a thrill, too! For the past 6 years, the R-3000 engines used by this quality and safety conscious airline have been overhauled by Airwork.

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MIAMI, NEWARK.



**Airwork**  
CORPORATION  
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## WHO'S WHERE

### In the Front Office

Edward J. O'Brien, vice president in-charge general manager of Kansas Aircraft Corp., Kansas City.  
Earl R. Uhlir, vice president in-charge of Class L, Martin Co., Baltimore.  
Dr. Harold M. DeGroot, director of Parody University School of Aeronautical Engineering, effective July 1. He will succeed Dr. Milton U. Chesser, now with Texas Workship Corp. on a sabbatical leave of absence from Purdue.  
Cora St. Edwards, North Carolina, local member of World Aircraft Ind. Assn., Los Angeles.  
E. L. S. Mink, a director of Dr. Harold Mink, Eugene Co., Los Angeles, England. Mink is chief engineer of the company.  
Paul E. Wolcott, manager of Transco Helicopters Corp.'s board of directors, Wixom, Mich. He had resigned as a director of the Martin, Pa. firm.

### Honors and Elections

John L. Abbott, president of North American Aviation, elected an honorary doctor of engineering degree from Stevens Institute of Technology.  
Clarence M. Belton, president of Los Angeles Aircraft, elected Aviation Man of the Year by members of Los Angeles Inter-Aircraft Assn.  
Leonard S. Hobbs, United Aircraft Corp. vice president engineering, awarded an honorary degree of doctor of laws from State A. & M. College.  
Edward H. Hunsinger, chief engineer of Douglas Aircraft Co. (El Segundo, Calif.) Division received a certificate of honorary fellowship and his membership in the Society of Aeronautical Weight Engineers.  
Glen W. Harbo, executive assistant to the managing director of High Safety Fan drives, Inc., received the Laid Key Hero Brochure, presented by "debt" general service in the field of an industry.

### Changes

Paul M. Delcorra, chief preliminary design engineer of Lockheed Aircraft Corp.'s Georgia Division at Marietta. This appointment will replace John P. Smith, Jr., now, director of Georgia operations for Lockheed's California Division at Burbank.  
Angus R. Sengstack, manufacturing engineering for Republic Aircraft Corp. in St. Louis.  
Also appointed: Arthur R. Sengstack, chief of research in new research and development, and Russell Smith, chief experimental test pilot.  
Alexander H. Fin, assistant director of General Aeronautical Laboratories at Bufile, N. Y. Other changes: Dr. Mark Fetter, in special in the director of Bufile, Chief of the new machine elements; Robert Kluge, head of the weapons system design department and responsible for the production and coordination of C.M.'s complete program; and Edward R. Foster, chief of engineering design and shop.

(Continued on page 66)

## INDUSTRY OBSERVER

- Flight testing of a nuclear aircraft engine into take place within a year aboard a Convair B-36. The engine will not power the B-36 but will merely be taken for a ride to check design and other characteristics while airborne.
- Convair Atlas intercontinental ballistic missile will have guidance system developed and built by Ames Division, American Bosch Corp., Garden City, L. I., N. Y.
- Douglas F4D Skyray has developed a system high altitude still speed variation of the Pratt and Whitney J57 engine. Convair develops about 40,000 ft. and near supersonic speed and is attributed to the fact that the engine is not operating at an altitude of 40,000 ft. but is in the air.
- Northwest Airlines will receive a new aircraft from the company's Tacoma plant. Flight testing now under way at Edwards AFB to develop a "five" speed propeller gearbox.
- Production schedule for Lockheed F-94A has been advanced about four months to insure full replacement for one of the prototype aircraft lost. One is plane now ready at FT. Belvoir, but scheduled to be replaced by the new aircraft. The aircraft is scheduled to be replaced by the new aircraft. The aircraft is scheduled to be replaced by the new aircraft.
- Boeing F4U and Airplane Corp. has installed a standard Aerobics engine—F4U to test boundary layer control and passive distribution characteristics.
- Boeing Aircraft Corp.'s new owner and president, Sidney Albert, is expanding and diversifying his interests into electronics, missiles, drones and other fields. Boeing probably will become a holding company for the Albert interests.
- Boeing Aircraft has tested a modified N4e modified version of the N4e aircraft, which is being developed by Boeing. The aircraft is being developed by Boeing. The aircraft is being developed by Boeing.
- Registration Board says it has received \$371,641.40 in excess of a quota over the Board set established in 1951. Regional boards now have a backlog of 1,383 cases from 1952 and 1953.
- President Robert Gern recently gave this explanation of Lockheed wing design philosophy: "In the very last stages, up to 400 or 500 mph, the straight, sleek, sleek, high lift wing is best. In the range from approximately 500 mph to 550 mph or 700 mph, some form of swept wing is best. We feel that there is a better answer, based not a little about that where the delta wing comes into its own and is probably the best. The delta wing that particular time is rather narrow. One up about that from there on out about 400 mph, we think the very best, sleek, sleek, sleek wing comes back into its own."
- Convair test pilot "Shorty" Coleman who flies the company's vertical takeoff fighter, has designed a delta-wing business aircraft which is expected to have a 200 mph top speed. The aircraft, now under construction, will be a "top-down" with wings folded, it will be in the automobile. With gear retracted, it will be capable of water landings. Coleman, building the aircraft with his own hands, plans an announcement soon.

## BENDIX WEATHER RADAR FOR EXECUTIVE AIRCRAFT



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## Washington Roundup

### More Red Air Shows

The Russians, as predicted in *Aviation Week* (June 13, p. 15), displayed more new aircraft over Moscow last week in preparation for the June 29 fly-by celebrating Red Air Force day. Among the new types identified in the practice flights (which in the week since a true captive audience transport helicopter in the rear range of the Prospekti II-16 (40 passengers). Formation of 11-35 four-engine fighters, two-engine bombers and the largest single formation of four jet fighters—11 planes—were also seen in the air over Moscow last week. Static display at Moscow air museum and space ship models also opened in a public park in Moscow.

Fact that Russians are placing increasing political emphasis on public display of their growing airpower to impress foreigners is evidenced by their agreement to participate in the Aero Club of Geneva International Show in September 1967. They are leaving to counter the Russian exhibit with a B-56 and B-47 aircraft bombers and a C-124 Glushko transport.

### Weapon Progress

There are signs that Defense Department research efforts appear "breakthroughs" in April 1967 that will both patch and accelerate in reliability of existing weapons for airbases in Moscow, then later have been stimulated by recent developments. In testimony before the Senate Appropriations Committee, Maj. Gen. Robert S. Moore, special assistant to the Defense Department commander and the House was pointed to cutting the department's research and development fund support on the basis of what they knew about the program. Assistant Defense Secretary, Douglas A. Quisenberry went into executive action with the committee to give them information not previously available when the House cut \$13 million from the request. The Senate reduced the cut, authorized transfer of \$300 million from other funds to \$600. Advances are expected in accelerated research, experimental studies and space studies.

### Flood and Keiser

Question as to whether Air Force should contract with Bendix, Whelan Co.—instead of Keiser Aluminum and Chemical Corp.—for operation of the new heavy jet facility at Hurler, Md., was raised on the House floor by Rep. Dan Flood (D Pa.).

Rep. M. G. Berman (D-Md.) countered that Keiser was not ready and competitive bid procedure Flood commented "I have heard from friends in eastern banking circles that no less a personage than the chairman of the board of the First Boston Corp., G. D. Woods, went to the Secretary of the Treasury and asked him to intervene with the Air Force to get the facility for Keiser. I certainly hope that is not so."

Berman gave the chairman of events. Keiser now wanted a letter of intent in 1967 to construct and operate Hurler—after the Air Force considered the qualifications of a number of domestic contractors including Harvey.

• Armed Services Committee of House and Senate approved the Air Force's request of the operating agreement to Keiser in 1964.

• House subsequently tried to persuade the Air Force to

take the plant over from Keiser and give it to Boeing.

- Air Force in March decided to revise competitive bids. Keiser, Harvey and Reynolds Metals Co. were the only companies who accepted the invitation.
- Keiser has now been awarded the Hurler contract by the Air Force twice after his competitors.

### USAF Plane Procurement

USAF will require an aerial assault procurement budget of \$6 billion just to maintain and modernize its 137 wing program, according to testimony by USAF Secretary Harold E. Talbot before the House Appropriations Committee. Any increase in the 137 wing strength were authorized could mean a corresponding increase over the \$6 billion aerial procurement rate.

### Navy Plane Procurement

More will need to buy 2,400 new aircraft annually to maintain its authorized strength of 18,000 planes, Navy Secretary Charles Thomas recently testified before the Senate Appropriations Committee. Thomas said Navy would buy less than 2,400 planes in April 1966 because reduced defense money would in developing new types would make it unfeasible to buy heavily before major development problems on those types are solved. He said Navy would have to ask for funds to buy more than 2,400 planes in April 1967 to take up the slack.

### Exit Willis

Charles F. Willis, Jr., one-time operator of a neo-conservative corporate journal, quietly bowed from the White House scene after a long-term 21-year tenure as a Presidential staff member. Given in hot water for his handling of GOP patronage matters, Willis also dabbled in Administration politics and communications decisions like a union activist involved known with the Air Conditioning Contractors.

Willis will join W. B. Grier & Co. as assistant to Charles E. Wilson, chairman of the executive committee. His resignation, effective June 30, was accepted by the President, with deep regrets. Others are saying that Willis will be asked to testify before congressional committees when he no longer enjoys White House staff immunity.

### Air Power of the Summit

Refugee standing of Russia and Western nations in air power race will be lasting over the tables when Big Four meeting gets under way in Geneva next month. There is evidence that Soviet display of new strength may have been made with this in mind and it has not escaped attention of Gen. Alfred M. Grassfield, assistant chief of staff for the NATO chief recently and U.S. secretary in long range air power issues we could beat the Reds before they can do more than Russia will not find the answer and hold its own unopposed in the long.

Still he: "While we have the better long range air force, we do not yet have the capability on the ground and in the air to be capable of inflicting as all out attack.... The Soviets are aware of the effect of long range air power."

—Washington staff



## CATEGORY DISTRIBUTION OF AIR FORCE

Fiscal 1956 Military Construction Authorization

	Total	On Account
Buildings	1,000,000	1,000,000
Structural Steel	1,000,000	1,000,000
Steel Plate	1,000,000	1,000,000
Steel Pipe	1,000,000	1,000,000
Steel Joists	1,000,000	1,000,000
Steel Beams	1,000,000	1,000,000
Steel Columns	1,000,000	1,000,000
Steel Trusses	1,000,000	1,000,000
Steel Bracing	1,000,000	1,000,000
Steel Decking	1,000,000	1,000,000
Steel Lining	1,000,000	1,000,000
Steel Reinforcement	1,000,000	1,000,000
Steel Fasteners	1,000,000	1,000,000
Steel Welding	1,000,000	1,000,000
Steel Painting	1,000,000	1,000,000
Steel Maintenance	1,000,000	1,000,000
Steel Inspection	1,000,000	1,000,000
Steel Testing	1,000,000	1,000,000
Steel Fabrication	1,000,000	1,000,000
Steel Erection	1,000,000	1,000,000
Steel Dismantling	1,000,000	1,000,000
Steel Recycling	1,000,000	1,000,000
Steel Scrap	1,000,000	1,000,000
Steel Waste	1,000,000	1,000,000
Steel Salvage	1,000,000	1,000,000
Steel Reuse	1,000,000	1,000,000
Steel Disposal	1,000,000	1,000,000
Steel Storage	1,000,000	1,000,000
Steel Transportation	1,000,000	1,000,000
Steel Distribution	1,000,000	1,000,000
Steel Consumption	1,000,000	1,000,000
Steel Production	1,000,000	1,000,000
Steel Importation	1,000,000	1,000,000
Steel Exportation	1,000,000	1,000,000
Steel Trade	1,000,000	1,000,000
Steel Balance	1,000,000	1,000,000
Steel Surplus	1,000,000	1,000,000
Steel Deficit	1,000,000	1,000,000
Steel Inventory	1,000,000	1,000,000
Steel Stockpile	1,000,000	1,000,000
Steel Reserve	1,000,000	1,000,000
Steel Fund	1,000,000	1,000,000
Steel Account	1,000,000	1,000,000
Steel Record	1,000,000	1,000,000
Steel History	1,000,000	1,000,000
Steel Future	1,000,000	1,000,000
Steel Past	1,000,000	1,000,000
Steel Present	1,000,000	1,000,000
Steel Total	1,000,000	1,000,000

ports that will plan a major role in improved logistics capabilities.

## Construction Requirements

Major accounts in this field

- Operational, storage and loading operations for the B-52, now to be phased into SAC's lines
- Expansion of the air defense network, including training sites in the U. S. and Canada and higher interceptors here
- Fueling basing
- Aircraft fuel storage
- Guided missile and jet engine aircraft requirements
- Research and development projects, including development of nuclear power reactors
- Development of the base complex in Spain
- Facilities for bases deferred from previous programs due to lack of base rights
- Replacement of deteriorated, obsolete and substandard facilities. Total replacement will go on method facilities, distribution and storage, fuel, personnel and recreational facilities

Major share of the money sought for the continental U. S. will go for SAC bases. With the extra funds sought to convert the Texas and Puerto Rico fields to handle the B-52, this will amount to more than \$250 million in

1956. The rest of the total program, about \$190 million, more than half of it for work on the aircraft control and support facilities.

Of course, more \$245 million is sought to work on various fuel storage and maintenance facilities for the U. S. Air Force in Europe. Sites are in France, United Kingdom, Spain, Germany and other countries.

## Major Program Items

Though set for August Week when other major points in explanation of them on the 1956 air base construction list.

- Real estate, 99.1 million. USAF acquires land in the approach area to all new bases from the end of the previous year, 2,000 ft. in a 1,000 ft. wide at the lot and. This area is kept clear of all obstacles. Parcels are acquired wherever possible to give protection against obstacles beyond the fence.
- Operational, storage and loading operations for the B-52, now to be phased into SAC's lines
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## COMMAND DISTRIBUTION OF AIR FORCE

Fiscal 1956 Military Construction Authorization

	Authorized	On Account		Authorized	On Account
Continental U. S.	1,000,000	1,000,000	Continental U. S.	1,000,000	1,000,000
Europe	1,000,000	1,000,000	Europe	1,000,000	1,000,000
Asia	1,000,000	1,000,000	Asia	1,000,000	1,000,000
South America	1,000,000	1,000,000	South America	1,000,000	1,000,000
North America	1,000,000	1,000,000	North America	1,000,000	1,000,000
Europe	1,000,000	1,000,000	Europe	1,000,000	1,000,000
Asia	1,000,000	1,000,000	Asia	1,000,000	1,000,000
South America	1,000,000	1,000,000	South America	1,000,000	1,000,000
North America	1,000,000	1,000,000	North America	1,000,000	1,000,000
Europe	1,000,000	1,000,000	Europe	1,000,000	1,000,000
Asia	1,000,000	1,000,000	Asia	1,000,000	1,000,000
South America	1,000,000	1,000,000	South America	1,000,000	1,000,000
North America	1,000,000	1,000,000	North America	1,000,000	1,000,000
Europe	1,000,000	1,000,000	Europe	1,000,000	1,000,000
Asia	1,000,000	1,000,000	Asia	1,000,000	1,000,000
South America	1,000,000	1,000,000	South America	1,000,000	1,000,000
North America	1,000,000	1,000,000	North America	1,000,000	1,000,000
Europe	1,000,000	1,000,000	Europe	1,000,000	1,000,000
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# Paris Air Show Spotlights French Gains

By William A. Waterman

Paris—The twenty-first International Salon de Aeronautique at Le Bourget Aerodrome here showed for the first time since the war that aviation in Europe has come a long way. The show has a strong NATO flavor and everywhere the feeling is one of optimism—that at last Europe is beginning to make a real contribution in modern aircraft and equipment towards the defense of the West.

French shows tangible signs of being well on her way out of the armistice doldrums which have stalled her production since the war. For years her

public production of prototypes—64 in 1945—has long been criticized as American and British. This year France shows that she has something good and something tangible to offer in addition to the blather about the never letled.

The French policy of research and development appears to have reached the point of stage.

France's technological dilemma has not always been understood by our sides.

It stems mainly from the disaster of the last war when the French aviation industry came to a virtual standstill and her designers and engineers lost five years contact with modern techniques.

At the beginning of the century, France led the world as aviation. Her engines, planes and pilots showed the way. In World War I her Spad was a favorite of American flyers. Between the two wars France led her own last World War II. It might be short as aircraft. French squadrons were in combat in Spanish fighters such as the Dewoitine D.520 which was comparable to the Spitfire. After the liberation great gaps existed in French knowledge and techniques. A limited budget, a shaky economic and political scene further complicated the scene.

## French Solution

But the French took a logical approach. Without the vast resources available to the United States they knew they could not budget for research and production and at the same time rebuild their military and civil aviation. So, this first foreign aircraft to keep their shops working and concentrated on exploiting ideas and trials engines. Foreign ideas were studied but not members of new ideas were tried. Many did not make the grade either did. Research extended to all aspects of aviation, weapons and electronics.

The 21st Paris show tells him from years has been that. With one or two notable exceptions such as the Mistral fighter the French have not bettered their heads against tough international competition. Rather than have searched out the weak spots in the world's industries, these fields

which other nations have either ignored or not exploited. French aviation has devoted its energies to studies not tackled in other countries. In this she has achieved a large measure of success.

An example is French engines. France has built turbo-prop and jet engines in large quantities and jet engines in large quantities in the latter. Now her Ataris and Valerons have arrived and are on a par with the big stuff of other nations. In the field of light gas-turbines she stands supreme with her Turbomeca series of small jets, turbo-prop and gas producers. These engines are being built under license in the U. S. by Continental and in England by Blackburn.

At the show, Turbomeca revealed their new engine, the 2,625 lb thrust Coléone. Test order: French firms have shown light engines in the 2,000 to 3,000 lb thrust class—the Suresse Vents and the Hispano-Suiza Model 500. With additional development and an afterburner the Model 500 will give about 4,500 lb thrust. All these engines are used first type. The Model 500 has been run about 100 hours. The designs are noteworthy for their small dimensions. These contrast with the short radius turbo-turboprop Cyclone of 3,250 lb thrust which was displayed for the first time.

## J57 Show

A range of small French light plane engines was on view but the star displayed in this category came from beyond the Iron Curtain. It is a very clean and neat member of the 100 hp class of 197 horsepower built by Motovilik of Prague who are well known for their excellent Walter Major motors. But its engines varied from the small Red Buller Bee to the 11,000 lb thrust Renault Gnome. U. S. engine makers were represented by a subsonic and supersonic General Electric J57, a Wright J65 and a Pratt & Whitney J71. One of the J71s was on the other hand an abject failure.

On the aircraft side, the French have concentrated in planes which will take their own engines. This is seen in the first light jet-powered planes shown by Segni Fouge and Morane. As transport and private transports they are virtually unexcelled elsewhere. The Fouge Vigor is recommended as a NATO transport the Morane Fm being demonstrated by Beech in the U. S. By comparison the Fiat and Fokker jet trainers are large and heavy machines. A series of light build-it-yourself planes is available in France. These are the Turbo and Jodels that are being



SE 310 CARAVELLE, first French-built jet transport, takes off on test flight powered by two Rolls Royce Avon engines.



LEBEC'S LITTLEFLY flies the only non-carrying concept aircraft, the Jodel 435, prototype for future expensive interceptor.



William A. "Bill" Waterman began his long career in the Royal Air Force by flying Bombers to cross the English Channel in 1940. He also served in the Texas Atlantic Ferry Command, the Special Mail V.H. High Altitude Squadron, Fighter Command, Western Flight and flew almost every type of American, German, Italian and British fighter in competitive trials for Fighter Command. He was a member of the RAF High Speed Flight that brought the post war world speed record back to Britain with the Me109.

Waterman joined Glendon Aircraft as chief test pilot in 1946 and has represented jet prototypes and production aircraft including all of the initial flight testing of the jet-fuel delta all-weather fighter and the Canadian Avro CF-100 all-weather fighter. He was awarded the George Medal for saving the last prototype delta in an emergency landing after the elevator came off at high speed. He also holds the Air Force Cross with bar. Waterman was born in Edmonton, Canada and educated at the Royal Military College of Canada. He is now a freelance correspondent for the London Daily Express.



SO 1200 GAMIN is undoubtedly from Polaris harbor.



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in some hundreds on either conventional jet engines or special light motors.

In the heavier types of small planes, at the show, U.S. Cessna and Beechcraft were in a class by themselves but it is noticeable that their trend is to bigger and heavier types whereas the Italian and French planes remain much smaller.

#### Supersonic Fighters

French fighters are assuming new importance. Of the four European planes exceeding the speed of sound in level flight, three are now French. These will fly on the final days of the show.

They are the Dassault Super Mirafiori, a lighter, simpler plane, but closely resembling the Super Sabre, the new Mirage delta Conquest which gets supersonic without the loss of maneuverability and the straight winged jet and rocket powered Secour Trident. This latter is concealing the speed of sound in clouds and is actually what British manufacturers are claiming in the shape of their own future supersonic fighters.

France has taken the lead in building a practical plane to demonstrate the need for expensive land commanding stations. The Breguet, supersonic in a dive, has done a lot of thing off beaches, mountains and exposed fields. It lands on wheels which extend from its belly, jetties as short as landed aircraft's tail and from then on can fly like an ordinary fighter. Takeoff is from the water.

When the Secour Breguet reaches flying speeds at lifts off the tail fin which disappears and automatically takes itself out of the way. This fighter has been taken off wing only in slide and it runs on its tail fin to other areas.

The huge target Leduc 023 was on display but is still experimental.

The Secour Vautour is a twig off

weather fighter and bomber in the U.S. style with engines slung in pods beneath swept wings similar to the Douglas B-66. It is a five airplane and is expensive in a dive.

France has not tracked heavy bombers or transports but in the final days has 32, she has built a reconnaissance transport combining a long, narrow, high speed wing which looks to be about the best replacement for the DC-3 jet offered.

Presented in the same manner as the DC-3 it carries twice the load for the same distance and at the same speed.

The French Navy has ordered a hundred for anti submarine work and as a commercial operator said "You can't capture a plane which does what this one does."

#### Airwaves Display

The light French helicopters utilizing the Teledyne engines commanded much interest. Recently, a Secour Alouette II set a world's altitude record of more than 27,000 ft.

The atomic equipment on display was of excellent quality. So was the first equipment shown. A three dimensional radar set was of particular interest. Of French design, it accepts the entire sky with a single set gathering and processing information on altitude, distance and direction.

France's missile labor force, of 60,000 is small and so is the country's missile budget. Yet the results, though slow, now seem to be making technology is excellent and the production engineering and tooling skill is available. But unless large orders are placed (less than a thousand Dassault Mirage and Mirage fighters has been officially said) costs are bound to be high and production rates low. A definite trend towards lightweight missiles and simplification of fighters and engines are noticeable at the show. This may be the solution to quantity production on limited resources.

#### Lockheed-Bell Merger Talks

Lockheed Aircraft Corp. and Bell Aircraft Corp. are discussing a merger in a new sense of the on-going merger talks conducted over the past five years. Merger would combine Lockheed's large military and commercial aircraft business with Bell's production of guided missiles, helicopters, rocket propellers and motors.

Not work of the two companies would total approximately \$225 million, 900 million from Lockheed and \$35 million from Bell.

Internal moves made both Lockheed and Bell analyzed reports of the merger talks last week, despite official statements denying combination of the two firms is not imminent. "There is some talk in these talks," one source told Aviation Week. In a formal statement, Robert E. Goetz, president and chairman of Lockheed, said: "During the past five years we have been in a number of companies, all of which, including Bell, but there is nothing more imminent now in the matter of a merger than at one time in the past five years."

Lorenson D. Bell, president of the smaller company, commented: "We are always willing to talk merger with other companies if we can make out a stronger organization."

## Senate Unit Approves New Air Force Budget

Senate Appropriations Committee last week approved a new U.S. Air Force budget of \$14.7 billion, including additional funds of \$1.65 million to accelerate production of the B-52 intercontinental jet bomber (AV-16, p. 17).

The committee also ordered \$10 million deleted by the House from the Defense Department's emergency fund for research and development. In addition, the Senate group recommended approval to transfer \$200 million from other funds to meet R&D needs.

Other key military research programs for Fiscal 1956 approved by the Senate group without change were:

- Naval aircraft and related program, \$985 million. This is \$1 billion less than the fiscal 1955 allocation.
- Air Force research and development, \$570 million. This is \$152 million more than the fiscal 1955 appropriation.

- Naval aviation research and development, \$305 million. This is \$7 million less than fiscal 1955 appropriation.

The total \$14.7 billion USAF budget approved by the Senate group is \$3.8 billion higher than the fiscal 1955 budget and \$318 million more than proposed by the House.

The total Naval aviation budget approved by the House of \$1.7 billion was accepted by the Senate committee. It is \$1 billion less than the fiscal 1955 budget and \$49 million less than the Administration's request for fiscal 1956.

Other military budget is left the committee. Total \$11.516 billion was \$348 million more than half of the total national budget. In addition to the Air Force fund, it provides \$7,500 million for the Army, \$9,000 million for the Navy and \$295 million for other military activity.



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## Napier Plans U.S. Tour Next Year Of Turboprop Eland-Convair 240

London—D. Napier & Son, Ltd., hope to bring their Eland/Convair 240 to the U. S. for a demonstration tour next spring. Meanwhile, the company plans to start profit tests of the turboprop tomorrow, Dec. 30, with flight trials for Civil Aviation Authority certification following shortly thereafter.

Airlines in Europe and Canada will then get a chance to see the plane on its demonstration tour.

Several Convair engineers visited Napier's factory at Luton to assist in the conversion. The British firm says engine changes were kept to a minimum. The existing nacelle was retained. The turboprop engine will generate coming speed 59 mph at 3,500-rpm, says D. Napier & Son. Convair is expected to 40 mph.

Napier is also getting Elands on a de Havilland Doves (Amherst) for flight tests beginning July. The aim is to fly the plane at Embury and have it available by Nov. 1976 for freighter evaluation service with British European Airways, whose entire Embury fleet would be converted with the Eland turboprop.

Napier is using a Nelson Vaux as being test bed for the Eland. They have installed a dead Eland at 25,000 ft. The engine has completed over

3,000 hr development running and an engine has been started from the Vaux because of mechanical trouble, the company says. A 7-to-1 compression ratio is desired. Napier also says the engine has the lowest installed drag of any propeller up to 4,000 hp.

Target for cruise speeds is 2,800 hp on the cold end and 3,000 hp on the hot end. The hot end can be supplied without removing engine from nacelle—it has been done in 3 hr 40 min. The reduction gear has been type tested at 4,000 hp. The engine's speed rising speed goes down to 6,000 rpm, and accelerates down flight taking is full throttle takes less than 3 sec.

The 3,000-hp single-shaft Eland is controlled by a single lever operating an electronically powered governor and Napier fuel metering unit which automatically compensates for changes in forward speed and ambient temperature and pressure conditions. A control is included in the unit to prevent overloading and stalling of the engine during acceleration.

Napier was the first engine manufacturer to start turbine development in Britain. After the war it opened a 54-million research station. Eland production has begun at the firm's Luton plant.

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# HOW A NEW PROCESS IS BREAKING THE BOTTLENECK IN MICROWAVE FITTINGS

Rather than silver systems use microwave fittings, in the form of elbows and joints. These fittings connect long runs of aluminum tubing, channeling high-frequency radiofrequency microwaves.

In the past, accurately high quality standards resulted in high reject rates, increased costs, slow production. But now, it's possible to maintain finish the work of our fitting, yet they must be perfectly smooth. A single leak or deviation in tolerance nearly destroys and discards microwaves.

Today, Howard is meeting microwave standards of quality—its quality—with a new casting method, called the Ekin process.

With this process, Howard now guarantees to deliver castings with second, mirror surface finishes of a maximum 50 microinches—a finish responsible for the surface consistency of a S.W.P. impeller after cast.

Howard has, in some cases, held microwaves in excess to the thickness of a human hair. A manual process casting tolerance (0.0015" per inch) is usually held. And castings are dense, will pass 300% x-ray and X-ray inspection.

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Write for our new bulletin, No. 27, describing the advantages of the Ekin Casting Process.

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Please allow 4-6 weeks for delivery. Double Production Control System. Weld and Metal Fabrication. In-house finishing. In-house heat treating. Permanent mold and die. Low waste. Environmentally friendly. In-house maintenance.

## Court Backs CAB On Pilot Immunity

Despite one pilot testimony between Civil Aeronautics Board and Civil Aeronautics Administration (AW Apr. 25, p. 118) has been settled in a U. S. Court of Appeals decision in favor of the CAB. The court ruled that Civil Aeronautics Administration has no standing to petition for review in the case. "It is only relevant like that of the Board, in suspension proceedings it is preserving air safety by enforcing the Civil Aeronautics Act," said the majority opinion of Judge Henry W. Edgerton and Charles Fale.

"Final decision regarding suspension for violation of regulations continues to rest with the Board," they said.

The case arose as the result of a dispute between the two federal agencies over United Air Lines pilots L. H. Brubaker and C. E. Olson. They were involved in an accident and claimed Fifth Amendment privileges when testifying at the CAB investigation. CAA later asked CAB to suspend these certificates, but the Board rejected the complaint. CAA took the case to the Court of Appeals.

The majority of the three-man court held that the purpose of present review provisions is to allow relief to "persons aggrieved by the Board's action," not to allow litigation between the CAA's Administrator and the Board.

Judge E. Barrett Brennan, in a dissenting opinion, found that the Administrator does have standing to seek review on grounds that "if he has enough interest to be the official complainant in an adjudication proceeding, he has enough interest to seek review of the decision in the same proceeding."



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Rolling, annealing, and cooling are done with the same meticulous care. And every race and roller that goes into a Timken bearing is precision case-carburized to give it a hard, wear-resistant surface over a tough, shock-resistant core.

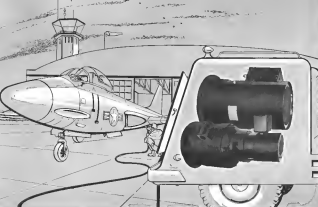
We've been specializing in the production of fine alloy steel for almost fifty years. We're the only bearing manufacturer in the country that makes its own steel, because it's the only way we can make sure the quality of our bearing steel is just the way we want it. Steel is the heart of the bearing. That's why we want to control every bearing quality every step of the way—from melt shop to final bearing inspection. And that's why we don't stamp us the tag of steel.

To be absolutely sure of the highest performance standards in the equipment you build or buy, always specify Timken tapered roller bearings. They are made from stainless steel as forgings by the most modern processes, under strict control. Only Timken bearings roll so true, have such quality thru-and-thru. The Timken Roller Bearing Company, Canton, 6, Ohio. Canadian plant at Toronto, Ontario. Cable address: "Timkencon".

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8-10

**GENERAL ELECTRIC**

### Aerial Performers at the 1955 Canadian National Air Show



AVRO CF-100 jets, 44, taken off for a 75-minute fly-by over the Canadian National Air Show in Toronto. Typical carry 290 gal of fuel each, mounting the RCAF jet interceptor's range to more than 2,000 miles. CF-100 is a RCAF's new Ghost Squadron.



CZECHOSLOVAKIA'S MIKOVSKY (shown below) took off to end the show from U.S. and Canadian military jet aircraft with difficult low-altitude aerobics. Two jet planes is powered by a 120 hp. Mikoyan engine and has a gross weight of 750 lb.



GRUMMAN S2F ANTI-SUB AIRCRAFT (shown in new Royal Canadian Navy colors for the first time). The U-5 biplane is being used to train RCN crews as the Herford Aircraft Co. looks up for production. First Canadian version, the CSF, is expected to roll out in spring of next year (AW June 13, p. 9).

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## SEC Lists Stock Transactions By Aviation Industry Officials

Disposal of 1,000 common shares of Northeast Airlines stock by Eugene C. Pinsky, director, leaving a holding of 11,000, is reported in the Securities & Exchange Commission's latest survey of transactions by officers and directors.

Other transactions reported for the and April to and May period included:

**ACP Industries, Inc.** Acquisition of 400 common shares by James F. Clark, officer and director, making a holding of 500.

**Aero Supply Mfg. Co.** Disposal of 600 common shares by Elmer M. Murphy, director, leaving a holding of 15,200; disposal of 300 common shares by Leo Strauss, director, leaving a holding of 2,100.

**Air Associates, Inc.** Disposal of 100 common shares by William H. Smith, director, leaving a holding of 1,000.

**Alaska Airlines, Inc.** Acquisition of 200 common shares through cooperation by Thomas A. Constantinou, officer, making a holding of 100; disposition of 100 common shares through cooperation by Robert J. Neims, officer, making a holding of 55.

**American Airlines, Inc.** Disposal of 100 common shares by W. Nelson Bump, officer, leaving a holding of 1,400; disposal of 700 common shares by G. K. Griffin, officer, leaving a holding of 1,000; acquisition of 500 common shares by James A. Jackson, director, making a holding of 500.

**Bell Aircraft Corp.** Disposal of 1,100 common shares by Otto A. Pfaff, director, leaving a holding of 7,270.

**Boeing Airlines Corp.** Acquisition of 400 common shares by Raymond P. Lanning, officer and director, making a holding of 3,204.

**Boring Airplane Co.** Acquisition of 112 common shares through cooperation by William M. Allen, officer and director, making a holding of 7,525.

**Buaird Airways, Inc.** Acquisition of 1,500 common shares by Eugene C. Pinsky, director, making a holding of 71,000; disposition of 700 common shares by Milton McGee, director, making a holding of 1,000; disposal of 500 common shares by Thomas F. Ryan III, director, leaving a holding of 60,000; disposal of 2,100 common shares by H. C. Shroder, officer and director, leaving a holding of 6,200.

**Capital Airlines, Inc.** Acquisition of 200 common shares by Arthur F. Kueger, director, making a holding of 915.

**Carson-Wright Corp.** Acquisition of 400 common shares by S. B. Kuzman, Jr., officer making a holding of 1,000.

**Douglas Aircraft Co., Inc.** Disposal

of 200 common shares by Frederick E. Hunt, officer and director, leaving a holding of 2,000; disposal of 100 common shares by Neil Peters, director, leaving a holding of 100.

**Electronics Corp. of America.** Disposal of 1,151 common shares by Alfred H. Ayres, officer and director, leaving a holding of 164,354.

**General Dynamics Corp.** Acquisition of 4,050 common shares and disposal of 2,621 common shares by Joseph H. Hagan, director, making a holding of 1,800; disposal of 1,100 common shares by G. T. Poyasov Robinson, Jr., officer and director, leaving a holding of 5,345; disposal of 1,000 preferred shares by Joseph H. Hagan, director, his total holding, acquisition of \$10,000 of 3 1/2% convertible debentures by Elizabeth C. Alford, director, her total holding.

**General Electric Co.** Disposal of 500 common shares by William Rogers Hunt, officer, leaving a holding of 4,376; acquisition of 1,500 common shares by Robert Patton, officer, making a holding of 7,621; acquisition of 1,044 common shares by H. W. Tordoff, officer, making a holding of 5,300.

**General Motors Corp.** Acquisition of 15 common shares by Charles T. Fisher, Jr., director, making a direct holding of 265; disposal of 200 common shares by Paul Garrett, officer, leaving a holding of 100.



**Ace in the Hole**

Surplus test spacers assist a production lathe at Glenn L. Martin Co. when facilities for drilling and hole in constant steel metal parts become overloaded. Spacers were provided with gear, punch, and hole plate for mounting them vertically on a table. The substitute is better than the method it replaced, Martin says, permitting faster grinding and keeping no de-burring.

# INTEGRITY



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# AERONAUTICAL ENGINEERING

Research is the foundation of successful progress. From fundamental investigations broadening the frontiers of knowledge to practical studies of specific problems, the influence of research makes itself felt in every contemporary airplane, powerplant and missile.

The pace of competition means that aircraft developers must have the most easily sets of tools in industrial history. Wind tunnels, laboratories of all kinds, extensive flight test facilities, all underline the emphasis on research and development in the aircraft industry.

The major benefits of this huge outlay in time and materials show in the advanced performance of contemporary aircraft. But as well known are the side benefits to other industries—bearing, automotive, non-aerospace radio and television.

In this article, two North American Aviation engineers examine the mechanism of research and development in the aircraft industry and point out the valuable influence of that work on other branches of American industry.

## Other Industries Share in Benefits of Aircraft Research

By George Eppinger  
and David Knappberger

The rapid progress of the aviation industry during the past decade is remarkable when compared with the slow, gradual growth of almost every other major industry, even the steel industry, which has lost to some very heavy losses.

The far-reaching effects of research in the aircraft industry are not always immediately obvious. Actually, it is difficult to find any major industry which has lost to some very heavy losses. The aircraft industry is the only one which has not been heavily affected by the war materials, engaged production and improved designs which have resulted from aircraft research.

Much of the research and development in aircraft is unconventional or, at least, of a far-reaching nature. For example, new and improved methods are being developed in the light alloys techniques of metal forming, heat treatment, spot welding, bearing, machine and rolling. Of special interest are the new conventional types of aircraft. New products and new uses for established products are being developed.

### Structural Development

The need for materials with greater strength-to-weight ratios became more critical as aircraft speeds were increased. This has already resulted in the development of structural plastics.

Both industries are employed in the Defense, Civil, and other divisions of North American Aviation. The Division, who holds a monopoly in the design of this type (1911), is a research engineer, and operates in the Division of Naval Aeronautics. Another of its tasks is to develop bearings for the turbine in engines on the subject of U.S. Navy, Knappberger, holds a master's degree in physics from UCSD (1951) and is a member of the American Institute of Aeronautics and Astronautics. He is currently working on the design of a new type of engine.

and advances and of rigid but light weight sandwich-type constructions. Requirements for rapid yet efficient production have brought about new techniques in forming of plastics, in etching large and complex patterns in metal sheets, in casting metal and plastic articles, and in attaching sheet-metal laminates to structures.

Progress in the new industrial materials such as titanium and aluminum, in ceramic and semi-conductor combinations, in composites, in laminated plastics, in substitution of aluminum alloys, in composites, is largely due to the vast amount of research being conducted in modern aircraft manufacturing.

From the very beginning when metal sheets were first employed in airplanes, they were used in the standard method of laminating. This was considered a satisfactory type of fabric used at present and improved flight. Due to the changes in aluminum brought about by higher speeds, temperatures and stresses, more emphasis in the use of metal which had proved standard or was considered unsatisfactory, now became apparent as laminating fabric.

Drilling of metal holes resulted in weakening the skin, anolytic design was produced by rivet heads and by rivets introduced into the skin, and even rivet locking became more serious.

These and other deficiencies in the use of metal led to research for a fabric which would eliminate the shortcomings and still do the job satisfactorily.

Advances have been developed which can secure the metal skin in the front of the aircraft, high eliminating the use of rivets. The skin is neither riveted nor modified and laminating fabric glass along a continuous unbroken area. Typical examples are Methodon,

developed by Consolidated Vultee Aircraft Corp., and North American Aviation's B-17 and C-119, which were developed by the Navy and the Army.

Today, metal advances are being employed to join metal to metal parts in such as metal joints and tape to metal, plastic to metal parts in the wings, glass to metal parts in the fuselage, and to metal parts in the fuselage.

The success of sandwich-type constructions, consisting of a lightweight core material sandwiched between two relatively thin and strong layers, is largely due to research activities within the aircraft industry. Developments in this field have led to their application in numerous civilian products such as in prefabricated housing, doors, table tops, partitions and flooring in large trucks.

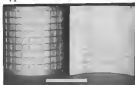
Fabrication of stainless steel sandwich-type constructions by means of bonding is today the subject of considerable research by aircraft engineering personnel. Bonding of steel sheets to even in the joining technique believed to hold most promise for extreme temperature applications. Once fully developed, bonded steel laminates and work structures would undoubtedly find numerous uses in commercial products such as ovens, engines, etc.

The welding in Rust Aeronautical Co. engineers in that welding will prove superior to bonding in many cases and will be a major step in the development of this type of aircraft.

Formed in place plastics (e.g., Lockheed, developed by Lockheed Aircraft Corp.) were originally designed for aircraft use. Industrial applications that have been limited to only a few special or experimental items such as printed electronic components, boats, refrigerators and shipping containers. Where industrial range will make as research by the aircraft industry assists in overcoming the present limitations of special bonding techniques and high cost of use materials.

Glass-reinforced plastic laminates which are currently finding increasing

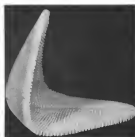
## Byproducts of Aviation Research . . .



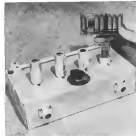
CHEMICAL MILLING apparently machining for turbine shapes.



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CONVENIENCE Miniature parts reduce design bulk.



COMPUTER Electronic analogs solve design problems.



connected applications over a large increase in their interest in research activities within the aircraft industry. A typical example, the polyester laminates, is being employed in numerous aircraft components and today is being found in many non-aerodynamic products such as storage tanks, ducts, piping, and the attractive bodies of the widely publicized sports cars and boats. Glass-reinforced epoxy laminates are now being considered for low-shrinkage plastic tubing such as duct and nozzle and for non-corrosive tanks and pipe lines, however, considerable research is still necessary. Probably no other single industry is expending so much research effort in the development of these and the phenolic and silicone laminates in the aircraft industry, at today.

Milling of metal, especially when it is required for the piping of large and complex machinery, has long been a wasteful and time-consuming operation. A chemical etching process for making intricate patterns in metal skins has been developed through research at North American Aviation, Inc. Most applications for this process are anticipated through out industry.

#### Aerionics to TV

A veritable revolution has occurred in aerionics in the field of electronics. Originally, the various sections of elec-

tronic equipment designed to be an integral part of an airplane were produced from outside sources; the fabrication of the aircraft companies was to mount the equipment and install the interconnecting cables and wiring of the airplane.

Today, a company like North American not only builds the equipment but starts production at the very beginning of the process.

Ordinary radio tubes, being made independently, just didn't do the job in aircraft. After extensive research as to the cause of failure, a department was set up for the testing of tubes. Every single tube used in aircraft is X-rayed, examined in a polaroscope, given a bend, is poked and, in addition, is put through all the conventional tests generally employed in industry. A complete laboratory is maintained of every tube used in aircraft and post-mortems are performed on tubes which fail during operation.

This system has paid off in the form of safety as well as in economies; tubes which have led and still are leading to improved designs of tubes by the manufacturers.

As the requirements have increased for more and more electronic equipment to be installed in military aircraft, the need for compactness and reduction in weight has increased. Thus, aircraft research in electronics

has been conducted in miniaturization, administration, control, control, painted controls and painted controls. The end results are products often not far removed from Dick Tracy's wrist which radio scanner listens to.

Have you ever watched an emergency vehicle, such as an ambulance or fire engine, go through a busy traffic intersection? Quite often the emergency vehicle has a red light system. As it approaches the intersection with siren screaming and bell clanging, it slows down a little, crossing, and then accelerates again.

The aircraft industry has come up with a simple remedy for this situation. With the aid of electronic control in the emergency vehicle, all signals turn red as the speeding vehicle approaches an intersection. Traffic comes to a halt and the emergency vehicle continues at its intended pace. Traffic lights revert to their normal sequencing after the vehicle passes. This system is being considered in some municipalities for installation along strategic highways to be used in emergency modes.

One of the most amazing electronic developments within recent years has been the creation of electronic lenses or computer instruments of this type have been applied to the solution of complex aviation problems; thus, the machine of an aircraft during flight can

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Reel design will be universal promptly.

**MINIATURE**

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be decreased severely without interfering the aircraft have the ground. Variable factors such as gusts of wind can be induced in mathematical equations, inserted into the computer and, as a matter of course, as shown can be obtained in a few seconds without much time consuming such a goal of wind during flight.

What will happen when one of the engine fails during flight? The computer knows and size tells.

One of the largest privately owned wind tunnels in the world is possessed by an aircraft company. The wind for the tunnel is obtained by vacuuming the air from a spherical chamber and filling a large volume bag with dry air, the bag being hardened to the inside of a cylindrical chamber. The tunnel connects the two chambers. The model of the airplane is mounted in the tunnel and when all is ready, a valve is actuated which causes the air to rush through the tunnel.

and into the vacuum chamber. A sensor on either side of the model permits motion pictures to be taken as the air rushes through the tunnel. Schlieren photography is used to reveal the shock waves and air flow about the test model. Thus data, together with that obtained from the instrumentation employed during the run, ultimately is used to determine the design of jet propelled aircraft and its propulsive control.

### Reaction, Princeton, Mexico

With the coming of the atomic age, the use of atomic powerplants cannot be far behind. Several aircraft and engine companies are conducting programs of research in atomic energy. North American Aviation, Inc., not only conducts atomic energy research but also designs and builds nuclear reactors to the specifications of the purchaser.

Would you sincerely associate the



Demon Powerplant

Allison reduction program (T1A) absolute support jet engine for disponent in McDonnell Aircraft, where it will be installed in (T1A) Demon, aircraft engine. Allison has confirmed Allison Week report (May 7, p. 11) that the T1A has passed USAF 116 to qualification test at over 10,000 lb thrust without vibration. The T1A sustained more than 10,000 lb thrust in the T1A (in engine, on ground) while delivering 4400 hp at 11,000 rpm, making it the most powerful jet engine per unit of thrust ever tested in flight. Four T1A, each with a thrust reduction for segmented thrust at 14,000, power the Martin XP4M Douglas B44 and RB-66 carry T1A without vibration.

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on the scope of manufacturing operations at Plant 3 is contained in this new brochure. Write for your copy . . . an obligation, of course.



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er of the picture as much as possible. In the design of every piece of equipment destined to be installed in aircraft, extensive research is first conducted to determine how the equipment will function under operating conditions.

Special refrigerators and ovens are employed to test equipment beyond the temperature extremes which might be encountered during flight. Shock tests, vibration tests and shock tests determine other limitations of the equipment.

In addition, every major aircraft company maintains a staff of trained personnel devoted to research in materials and the development of processes. Materials and processes must be tested and qualified for specific applications before being introduced into an aircraft component.

Research in the aircraft industry has resulted in air temperatures which are hot and reliable, new military weapons in the form of rockets and missiles and a host of benefits which the general public does not normally associate with the aircraft industry.

Special techniques in the welding of aluminum, new surface finishes for metals and woods, synthetic adhesives for bonding a wide variety of metals and dissimilar materials, fused plastics—these materials and techniques are typical of the effects resulting from research in the aircraft industry and are being translated into our industrial economy.



## Beacon Cuts Airport Noise

Washington, D.C.—A new way to measure noise in a surplus Army aircraft shows a 5 million configuration noise above those who depend to guide pilots flying off from New York's La Guardia Airport was speedily popularized. The new "Lafayette" is being purchased and installed by National Air Transport Coordinating Committee as part of its airport noise abatement program in the metropolitan New York area.

## Performance Proved...

FROM MINUS 80°F  
TO PLUS 400°F



## NEW AUTO-LITE

# 350

*Wire*

## GENERAL PURPOSE HIGH TEMPERATURE WIRE NOW AVAILABLE TO INDUSTRY

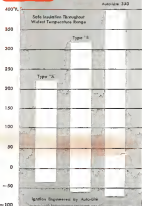
New Auto-Lite 350 wire, designed to meeting requirements of military aircraft, is now ready to serve a wide range of industrial applications. Three years in research, "350" was perfected by Auto-Lite for rugged duty in Air Force applications at one level or 10,000 feet... from rapid -90° to normal 400° F. Auto-Lite 350 maintains maximum flexibility... offers positive resistance to abrasive wear, flame, solvents, acids and lubricants.

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- Flame resistant.
- Shockless.
- Free wiring.
- Approved Spec. MIL-W-8777 U.S.A.P.

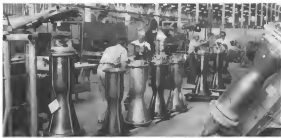
THE ELECTRIC AUTO-LITE COMPANY

*Wire and Cable Division*  
Port Huron, Michigan      Hazelton, Pennsylvania





## PRODUCTION



**ROCKET ENGINE PRODUCTION** is shown in last photo of this Ryan activity. Company builds rocket motor for Rocket Corp.

## Ryan Develops New Welding Techniques

By Irving Stone

San Diego-Ryan Aircraft Co. has interests in aviation research, design and production fields. But in the broad band of Ryan interests, welding comes in the least important position. Welding is incorporated in about 90% of the company's products, many of which can't be joined by any other

process because of the high temperature service requirements. For this reason Ryan stresses development of advanced welding techniques for the wide variety of alloys and applications it handles.

### Proving Lab

Big factor in this work is Ryan's relatively new weld laboratory, headed by J. R. Fullerton, research group en-

gineer. Functioning with a small staff, the lab acts as a proving agency for unusual welding problems.

The lab is now fairly well equipped and includes facilities for most air welding with all the standard and experimental gas equipment available, gas acetylene and gas hydrogen welds, and argon welding, both automatic and manual. Instrumentation is installed to check on welding process variables, and there are special controls such as gas flows, wire feed speed controls, timers.

Both instrumentation and controls are fabricated in the welding lab.

Naturally, new jobs go directly to manufacturing. But if the job goes hot of trouble ahead or some unusual it will go into the lab for solution—it's better to work bugs out there rather than on production floor.

Jobs which require new tooling or techniques or new materials have the details clarified in the lab, which then issues a job instruction sheet. This is as ABC on how to process the part, which lists machine variables and other things to be controlled.

The lab also maintains very close liaison with the production shop. All lab personnel must give at least two hours each day to service a process in any particular trouble spot. Not only are troubles solved, but there are constant efforts to improve equipment, boost speeds, cut cost.

Each man familiarizes himself with



**147** attachment in big Federal spot welding machine.



**148** new job: high-quality seam weld on automatic equipment.

all phases of work, successfully to make sure there is a new look at each job. This keeps the various welding processes "cross-fertilized" by allowing a relatively untrained man (though experienced in an associated phase of welding) to take an aggressive stance at work normally under the supervision of a man who "knows it all."

### Welded Honeycombs

All-external honeycomb joints get a close inspection in Ryan's weld lab.

This type of structure, figuring prominently in new aircraft development, is being studied for resistance to buckling of skin in case, as a result of a field survey by Ryan personnel.

Ryan is using the resistance welding approach not only because heating is not its specialty, but because it also sees these difficulties.

• **Heating adds weight** to the structure, whereas resistance welding does not.

• **Tooling requirements** for automatic based operations are excessive compared to the example, preparation of core and skin for thickness in turn costs.

• **High-temperature** heating often greatly weakens affect physical properties of (thick) material (and sheet) being joined, by making a successful process critical to the amount

of heating alloy added and time at heating temperature.

Ryan's resistance welding study on all-external honeycombs, started late last year, is establishing working parameters. These include:

- Cell size and shape.
- Core material and thickness.
- Honeycomb core thickness.

• **Minimum thickness** into (core material thickness to skin gap).

In the shop, the lab has fabricated cores of square cells and hex cells, with core gaps from .002 up to .005 in. Most studies now are being conducted with 1-in. honeycomb thickness.

Results now indicate that Ryan will be able to supply welded core, within

## Jet Engine Welding Jobs



**147** housing section's fusion welds get X-ray inspection.



**RYAN RAHJETS** for Hiles require weigh 14 lb, have high thrustweight ratio.

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MODEL MA-3

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• **D.C. POWER** - 25 S volts, up to 2250 AMP. for volt or single line start and servicing

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• **TOWING** - All wheel drive T-60 converter transmission for smooth, more dependable towing

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reasonable limits, in accordance with most aspects it has received from various bodies, various engine companies, and other activities.

Tests are not yet complete, and the extensive welded honeycomb structure is not yet ready for production applications. At this stage, no parts larger than six ft. are contemplated in the study. If development work progresses satisfactorily, the weld lab may go into the design of equipment to handle larger sizes of parts.

Even for Ryan has been working with 17-T901 and 323 stainless steels.

For inspection of structural honeycomb structure, Ryan is endeavoring to develop a non-destructive procedure which will show up any large areas of point-to-point bonding. A peel test is not considered the answer because it is a destructive procedure.

One approach to non-destructive checking might be the use of x-rays on the point-to-point bonding.

Lab developments in the field of remote welding are done on the production floor, because if the equipment required were installed in the lab, "the other factory" would be needed.

For its resistance welding work, Ryan has machines which will weld two pieces of stainless steel from .002 to .146 in., stainless steel from .002 to .130 in.

Machines also vary from a 60 watt-sec. stored-energy unit with a maximum of 10 lb. electrode force, to a 750-lb. 60-in. throat three-phase frequency-converter machine capable of about 15,000 lb. electrode force.

#### Welding Thin Sheet

Another study the weld lab is now conducting is the fusion welding of extremely thin 311 and 6061 (aluminum), Inconel X, 17-T111 and some of the experimental precipitation hardening alloys which are still classified by government as the mils.

Reason for this investigation of very thin material (taking in its adaptions for high-temperature (600-600°F), high pressure (700-800 psi) pneumatic ducting to meet advanced design requirements for operation of missiles is, yet require blood. Material has to be thin to keep weight down.

This application should continue to expand in the future, Ryan technicians



#### Cooler on The Inside

Climate buster of USAF's Air Force Command, Eglin AFB, Fla., is a complete environment, duplicating actual conditions for functional tests of USAF planes and equipment. Recent subject of the cold treatment was North American's F-100 Super Sabre, located by the inland Arctic weather. Temperatures as low as -45°F were reached during the series of functional checks of the plane's systems and associated flying tests. As made by having the plane up inside the bays and blowing through ports in the ice wall over the wing, nose, fuselage and other openings, maintenance can be checked and jet engine run in this environment test bays.









## Leakproof self-locking fasteners for integral fuel tanks

Aircraft designers have eyed the space-saving possibilities of "Wet Wing" or integral fuel tanks for some time. But... the "wet" nature of the wing must be fastened in such a way that highly volatile aviation fuels will not leak under the hose of the tank fasteners or seep out along their bolt threads.

ESNA has now developed the first completely practical answer to this problem. The new ESNA type A2300 floating anchor cap nut (see diagram) is a self-locking anchor nut with an "O"-ring and its base. In tests, the nut has maintained a perfect seal against pressures above 90 psi on either side, regardless of structural strain, vibration, or temperature changes. The seal is effective whether the bolt is installed or not, it is not destroyed by repeated bolt installations.

The type A2300 is the lightest nut of its type, 190 Lb/in. nut with weight only 1.8 pounds. It meets AS-N-5 specifications for operation between -66° F. and +250° F. It can be used for pressures beyond these limits by varying its component materials such as the "O"-ring. It provides 600 such missions floating action allowing quick assembly in spite of slight misalignment of bolt holes. The A2300 is 200% seal tested prior to shipment. The basic design has been approved by the USAF. Size range from 10/32 through sizes 1/4-28, 5/16-24, 3/8-24, 1/2-24, and 7/16-24. A gaging visual strip providing a series of regularly spaced A2300 nuts has also been designed.



The new Boeing F2F Jet Transport is among the first aircraft equipped with integral wing fuel tanks fastened with the new ESNA type A2300 leakproof nut.

floating ring of new ESNA type A2300, and seats all small aircraft per MIL-B-8833: resin, gasoline, oil, water, jet fuels. To insure trouble-free fastening for many applications with ANA bolts ANA it is possible to order such quantity for fastening as the job or for field replacement. Rings of different materials are also available to meet varying operating conditions.

## PRODUCTION BRIEFING

► **Pentech Aviation Corp.**, Los Angeles, Calif., has received a \$100,000 contract from Lockheed Aircraft Corp. for feasible spectro-quick mechanism for internal doors. Installations will go on B-94C Starfighter all-weather fighters.

► **Data Processing Associates**, Ltd., Ottawa, has been named Canadian sales and service representative by **ElectroData Corp.**, Pasadena, Calif., maker of digital computers.

► **Gerrit Manufacturing Co.**, New Haven, Conn., manufacturer of sewing machine attachments, has acquired **Alt-Marine Motors, Inc.**, Amityville, N. Y., maker of sub-fractional horsepower electric motors, fans and blowers.

► **Wilson-Stithson Co.**, Pacific, N. J., has added 8,490-ton and 1,700-ton aluminum extrusion presses to its line, which ranges to 5,000 tons. Firm is a division of H. K. Porter Co., Inc.

► **Rusell Engineering Corp.**, maker of GW radar systems and electronic fixtures, has moved into a larger, 21,000-sq. ft. plant at 510 S. Fair Oaks Ave., Pasadena, Calif.

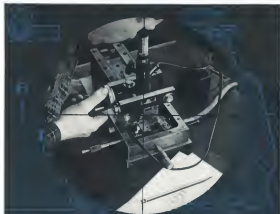
► **Zero Manufacturing Co.**, Burbank, Calif., has added two specially designed hydraulic presses to its facility. Firm makes deep-draw metal instrument cases, down aluminum bearings and junction boxes.

► **Simulation tests and demonstration** (billed electronically controlled aircraft power sharing unit, and helps company's engineers evaluate changes in the mechanisms. Duxbury cockpit displays plane controls and an oscilloscope traces the plane's movements. Both the steering unit and the simulator were developed by **Thiokol Engineering Associates**, Glendale, Calif.

► **Aluminum Co. of America** is installing a 345-in. water bed mill at its Decatur, Iowa, plant. The \$28 million facility is the latest step in a \$44 million expansion program.

► **William Bond & Co.**, Wilkes-Barre, Conn., has dedicated a \$60,000 jet plant at N. Woodbury. Plant makes Turbo plastic molded wire and cable and electrical insulated tubing.

► **Priggen Research Corp.**, Santa Monica, Calif., has received a \$25,000 contract from Lockheed Aircraft Corp. for seal-off fans for reducing of odors used in USAF Lockheed C-121C transports.



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## AVIONICS



High resolution given by Decca taxi radar is shown in this comparison of scope presentation and aerial photo of London Airport.



## London Airport Gets Decca Taxi Radar

By Philip J. Klein

The world's first Q-band (34,000 mc) "taxi radar" has gone into use at London Airport to speed takeoffs and landings by equipping the more than 100 airport surface traffic control consoles of poor visibility.

The new Airfield Surface Movement Indicator (ASMI), designed by Decca Radar Ltd., gives the British the added distinction of being the first to make a permanent two radar installation at a civil airport. The new ASMI, presently in limited production, reportedly costs approximately \$23,000, although a Decca spokesman indicates that the figure would drop for larger quantities.

An experimental U S two radar, operating at 24,000 mc, was evaluated

recently at New York International Airport in 1972 and presently is in use at Wright Air Development Center. An improved model, also operating at 24,000 mc is being developed by Aerospace Development Board and Rome Air Development Center sponsorship.

However, the new U S two radar is not expected to undergo actual evaluation tests until 1976. Decca has gone to the extreme and explored super high frequencies to give its ASMI extremely high definition and resolution, as shown in the above photos, enabling ground traffic controllers only to spot individual aircraft or vehicles on runways and taxi strips.

### Speeding Traffic Flow

Under poor visibility conditions, the rate of movement of aircraft into and out of an airport may be limited by the control tower operator's ability to see the runway and to detect an illegally landing that a recently landed plane has turned off onto a taxi strip. Without ASMI, the controller must wait for the pilot to inform him in radio that he has left the runway before another aircraft can be given permission to land or take off.

The new radar also will make it easier to guide pilots to the correct taxi strip, an important aid at large airports such as London, Japan's O'Hare and ASMI. Decca believes that runway occupancy times can be reduced by one third.

In addition, maintenance tracks and

taxiways, as well as fixed obstacles, show up as the ASMI scope, enabling the ground controller to more easily spot an aircraft.

And in the event of an accident under poor visibility conditions, the ASMI can be used to direct emergency services to the scene.

In mounting the ASMI antenna atop London Airport's 125-foot-high control tower, traffic controllers operate from a full 360-degree view of all ground movements. ASMI scopes (12 each) are set up in the main air traffic control room, one for use by the ground movements control officer and another for use in monitoring takeoffs and enroute traffic.

Phase call for the future installation of a third display in the approach control room for use in conjunction with the precision approach radar.

### ASMI Characteristics

According to figures supplied by Decca, its new Q-band ASMI is able to discriminate between objects separated by approximately 30 feet in range and 70 feet in bearing (at 1,500 yards). Other operational characteristics include:

- Peak power, 13.5 kw
- Antenna scan rate, 20-74 rpm
- Antenna beamwidth, 25 minutes (at half power point)
- Vertical beamwidth, 16 degrees
- Pulse length, 0.05 microsecond
- Pulse repetition rate, 4,000/sec
- Range marker, 1, 1, 1, and 10 miles
- Decca says that its Q-band radar can



Display unit of Decca radar installed in London Airport control tower.



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—S. S. Sargent Corp.



Price Electric Corp., Frederick, Md.

Other new sub-components and devices include:

• **Transducer** for transmitter circuitry is available in miniature type (J3900) measuring only 2 in. cube, but input or output types are available upon request. Interchangeable transformer has power impedance of 20,000 ohms, with a secondary impedance of 1,000 ohms. Frequency response is quoted as flat within 1 db from 150 to 15,000 cps, and transformer can handle up to 9.5 watts.

Manufacturer: Tekes Inc., E. & B. Div., Dept. 27, Tulsa, Okla., St. Paul 1, Minn.

• **Matchless paper capacitor** incorporated in Sargent's plastic battery interchanger shapers with metal, parallel, or radial leads which are designed to facilitate convenient placement of the components on printed circuit boards.

Manufacturer: Hughes Engineering Co., 3562 Lincoln Ave., Alhambra, Calif.

• **Powertransistor** measuring 4 in. in diameter are available with maximum of 100 to 100,000 ohms linearly in gain at 0.5%, power rating at 2 watts, and ambient temperature range at -55°C to 125°C.

Manufacturer: Air Electronics Associates, 125 Rogers Ave., Somerville 91, Mass.

• **Modulated modems**, Type TR, 4-watt, measure 0.14 in. long x 0.015 in. dia. Units meet an MIL-R-11 standard values, from 10 ohms to 22 megohms, with tolerances of 5%, 10%, and 10%. Voltage rating is 150 v rms, or d.c., maximum continuous. Data rate is 100 cps from 10 to 100 cps. Manufacturer: Altec-Bendley Co., 1318 S. Second St., Milwaukee, Wis.

## Symposium to Study Wave Propagation

Normal mode theory of wave propagation through stratified media will be the subject of a symposium at the Navy Electronics Laboratory, San Diego, Calif., July 5-7.

Sponsored jointly by the lab, Ryan Aeronautical Co. and the Office of Naval Research, the symposium is expected to draw a selected audience of more than 100 mathematicians, physicists and engineers.

The round table group will consist of 19 scientists from the U. S., England, France, Holland, Israel and Switzerland.

## FILTER CENTER

• **Electronic Matchless Converter**—American Society for Testing Materials has formed a new converter, designated F.1, on Materials for Electronic Tubes and Semiconductor Devices. The new group will concern itself with such data as grid wires, cathodes, wire windings, glass-to-metal seals and filamentary materials.

• **Attention, Sonnet Morse**—A new electronic converter, which accepts International Morse code signals and automatically converts them to printed page copy as a standard teleprinter has been developed by CGS Laboratories, 391 Tenth St., Stamford, Conn. Used is called the TRAK Automatic Code Converter.

• **Transistor Getting Better**—General Electric has extended the warranty period on its transistors from 90 days to a full year. GE reports its transistor life test data indicates as high as 95% survival after 10,000 hours operation at full rating.

• **USAF Switch to Collins**—Authoritive sources report that Collins Radio Company's new 11P transceiver, the 6158 (AW Sept. 15, 1972, p. 90), may become standard equipment on practically all USAF aircraft, except for Strategic Air Command bombers. Based USAF tests indicate that the 6158 can be expected to operate an average of 500 hours without failure, three sources report. SAC will continue to use the RCA-developed ARC 71 because of the increased channels available.

• **NAA Expands Activities**—North American's Denney plant has greatly expanded its services manufacturing in California, according to recent visitors to the facility.

• **Digital Techniques Speed-Write**—For Altec Industries Co. to announce a digital photography for use in bombing and aerial photography. Discussed reportedly will be accurate to one part in 500,000.

• **New Upa Capabilities Quality**—By employing X-ray examination of completed components prior to shipment, General Electric is able to spot construction defects which do not show up in conventional tests, but might cause failure in service. Used at present only for special high-reliability units, X-ray inspection results in rejecting 1% of the units that have passed all operational tests, and adds about 5% to engineer production costs, General Electric reports.



## Hughes Fire Control for CF-100

Hughes integrates fire control system for the CF-100 Mark 4 is shown in some action working at the Canadian International Trade Fair in Toronto. The Hughes Aircraft Co. system weighs 425 lb., has 181 tubes, and occupies 15 cu. ft. of space.

# LETTERS

## 'Gentlemen's' Pact

Your published letter concerning comments by engineers employed in the aircraft industry relative to the engineers' threat to quit and protest pay scales was kindly alluded to me and all of me fellow aircraft engineers.

It seems to me that a pertinent subject relating to the matter of pay scales in the aircraft industry was the "Gentlemen's Agreement" in the AIA's "Confidence Agreement" where participating companies will not let their engineers from other companies work

on jobs obtaining a contract from the company's current employer. Also, in general, they cannot leave any at an immediately higher rate.

It seems to me that these actions are in restraint of trade and that under other circumstances the Justice Department would be commissioned to investigate this agreement and to prosecute the participating companies.

The law of supply and demand does not have to be violated in affecting pay scales because of the effects of the AIA professional agreement. Furthermore, the law is passed will not govern unless both sides

*Admission: Each welcomes the opinion of its readers on the issues raised in the newspaper's editorial columns. Address letters to the Editor, Aviation Week, 230 W. 42 St., New York 36, N. Y. Try to keep letters under 500 words and give a genuine identification. We will use letters anonymously, but cannot of course tell the author of letters will be withheld on request.*

(the employer) and labor (the employee) are united with the information regarding the current supply. The actual comparison is a much better position in the respect than are the engineers.

The U. S. Government is presently inclined to prosecute participating companies in the "Gentlemen's (T) Agreement" because of the resulting effects on pay scales, and then reflect them at the cost of military contracts.

I can't help feeling that they've got a point. It's a timely matter.

LOUIS J. DINE  
Design Engineer  
Airport General Corp.  
Menlo Park, Calif.

## AMC Surplus Sale

Claude Weiss, May 35 article, "AMC Plans New Offshoot" (p. 38) mentions Air Material Company's efforts to dispose of aircraft surplus to Air Force needs, and states that the T-7 and T-31 fighters and C-47 transports will be sold "only after a report from the Commerce Department on possible impact of the sale on the aircraft industry."

I suspect as what. Even once the government begins having to recover some portion of an investment in ex-surplus stocks by selling them to the highest bidder, some potential profit has been recovered about "the impact on the industry," but on one item very concerned about "impact" of any surplus stock has even business the way all out of a selling to profit.

Since any aircraft manufacturers can plan ahead the "impact" of surplus stock engines, radios, or instruments that could be used in their own plants? These are engines, radios, or instruments manufacturers produced the "impact" of surplus aircraft that could use them produced.

To date, the "impact" on the industry of these sales has been a historic growth beyond the initial planning of income, boosting the government, the aircraft general public, the aviation public, the buying public, the aircraft, the country, the industry, the field base operators, the main engine shops, the aircraft parts and mechanics, the buyers, and everyone else in sight, including those who believed and thereby acquire the "impact," and quite more likely attract the "engine company" than a government that had already bought and paid for their products and their replacement.

ANALYST WEISS May 34 article, "Boeing Flying Inside Steady Growth Up" (p. 38) states that impact of the growth, and so evenly picture business living in "one of the keys to the mid-century aviation in American industry threatened by some-



BEFORE THE BIRD CAN FLY...

Leading aircraft manufacturers count on Crosley for every vital airplane component—from nose and wing assemblies to engine assemblies.

And Avco's Crosley Division has the experience, the tools and precision skills to meet all demands for Military aircraft production—as in full-scale airplane assembly. Here's further evidence of the coordinated manufacturing facilities and capacity that underwrite Crosley reliability—add even greater meaning to the promise that Crosley does the job right and on time!

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### • LETTERS

#### Inclusion of turbine and others

World renewable resources and resources have been so willing to make the equipment with it, but not the equipment to make it. It is a pity! Could aircraft and other personal manufacturers have developed this power, while accepting the fact that these power new production without the "upside" of these new engine sales, and at the price that would have been necessary to produce for an export market and highly depleted market?

There would be little world industry at this time if such engine sales had been left just to applied by all manufacturers in the world. While a manufacturer has some problems posed by the release of large, low-priced quantities of his own products (already bought and paid for cost), he can see little for his own engineers and sales one of his only salesmen is a government subsidy by way of distributors of second units.

Some manufacturers have found their solution in new products better adapted to civilian use. Certain, not as successful as independent, have chosen only in providing the "support" of the industry.

When the Department of Commerce said its report on the "possible impact of the sale on the aircraft industry," we would like to know that manufacturers have given not only to our manufacturer's completed version of their industry, but also the industry as a whole, the country as a whole, the thousands of small, or independent businesses who help build the industry, and the millions who have been fed from it, not to mention the given need and the taxpayer who stands to be charged with billions of dollars of "support" costs.

WILLIAM F. REMBERT, President  
Rembert Motors, Inc.  
Larchmont, N.Y.  
St. Louis 21, Mo.

(Defense Department policy, statement of July 11, 1955) said that when the sale of small commercial run property costing the government \$250,000 or more will allow either commercial market prices the engine will be temporary withheld from sale. Then the Assistant Secretary of Defense for Supply and Logistics, after calling the Commerce Department, will determine how the proceeds will be disposed of. The policy is for all surplus goods, not just airplanes—(En.)

### No Real Shortage?

In the Apr. 25, 1955 issue of your magazine I said the letter mentioning the shortage of engineers. I agree with these statements, but there is no shortage of engineers, it's just a problem of poor use of them.

While attending graduate school during 1952-53 I accepted a job with a nearby atomic firm as an electronic technician. I accepted a similar position with another atomic firm. This gave me valuable practical experience and also a clear view of the "engineering shortage."

I've studied between 1953 and 1955 some of the best and most serious problems with most of them.

One out of 10 graduate engineers seem set to be successful. The remainder are surplus and engaged in other work as engineering knowledge is not required.

Most firms are looking for the one out of 10 graduate engineers and in order for them to discuss the extra special "one out of 10 men" they employ often to find one who will be the one.

Why can't firms be honest and advertise only for what they need instead of seeking the false impression that there just aren't enough engineers to go around? It is difficult enough to find an experienced design position where he can actually do the work of an engineer.

We don't have anyone requiring for medical doctors to lead in the average firm in accounting for engineers, and a shortage of medical is probably much more evident in our society. The ASEE has said to it that the medical use isn't commensurate. This is a point where the engineering profession has failed to visualize clearly. The graduate can supply the low opportunity there is.

Let's not let happen to the engineering profession what happened to the American Air Force—understanding of the fact that the present state of affairs keeps up the engineering profession will be forced with the serious problem of being unemployed.

SAUL D. VILKOVIC  
1911 Avenida Blvd.  
Los Angeles 46, Calif.

### Props vs. Wheels

As an ex model of Aviation Week for some time now, I think first like to give graduate caps on your consistency of true and a first rate aviation magazine every week.

I am very pleased to be able to tell you that I plan to be a subscriber for a long time to come.

I should particularly like you to know how much I enjoyed your editorial "In Aviation Newsroom" on p. 112 of the Apr. 25 issue. It is most necessary for me to report how much I enjoyed it in this country, for location purposes and our own love for that matter.

The previous editorial reminds the past one and adds perspective in the United States and in Europe and for the United States. Now we ask if aviation is necessary in this industry of business, which continues to live if the best stopped but not.

Finally, the unfortunately mentioned writer on the Detroit News, besides being completely wrong in his statements does not realize what a very important part the aircraft industry plays in business and yet, even the business is wrong because I must say that I would not really being much business and comfort in traveling if the transport airplane should disappear from the sky.

However, let us hope that from now on the Detroit News will show that they understand things a little better and will continue to do so. The remaining portion is a little bit more important than being wrong.

Sherris, Rose  
119 Riverside Drive  
New York 24, N. Y.

*AMP goes to the heart of the modulator problem ...*



A-MP's new concept of service to Radio engineers is the Pulse System Package. The basic components of an A-MP Pulse System Package are properly matched constant impedance diodes, pulse forming network and pulse transformers. Where necessary, we will include switching relays, de-coupling circuits and other components. The use of an A-MP Pulse System Package simplifies system design, component stocking and testing and consequently, saves time and reduces size, weight and cost.

Our Part #21824 is a Pulse System Package for a SSB Modulator in similar applications.

### CHARACTERISTICS:

Output: 2000 Volts d.c., 65 MHz output

Output Pulse: 50% maximum  $\pm 10\%$  at 70% amplitude  
5400  $\pm 10\%$  Negative Pulse Width: 5400 maximum  
Rise time: 10 ns to 100 ns, 100 ns to 100 ns  
Maximum fall time: 10 ns to 100 ns, 100 ns to 100 ns  
These characteristics apply when operating into 1000 ohm non-inductive load.

Operating Temperature: 0° to 70°C ambient at 4000 pulses.  
Altitude: Sea Level.

Shock & Vibration: MIL-E-3400



Another Example of A-MP's Creative Approach to Network and Pulse System Problems.

**AMP**

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**CHEMICALS AND DIELECTRICS DIVISION**  
255 Park Street, Elizabethtown, Pennsylvania, Phone: Elizabethtown 7-1195

# Built-In Safety Claimed for Coupling

By George L. Chastain

A new aircraft quick-disconnect coupling, which the maker says cannot couple accidentally, is readily adaptable to any fluid and operates through the entire range of pressures now used in aircraft fuel, oil or hydraulic systems.

Manufactured by Weba, Inc., New Hyde Park, N. Y.

The only way the coupling can be disconnected is by applying a heavy force to an outer sleeve, Weba says. To connect, a mating machine is used. This coupling does not have to be safety wired, like other quick-disconnect units, Avitronics Weba was told. The coupling has a patent application pending for the unit.

The coupling has been approved by Wright Air Development Center in the U. S. too, is currently being used on Republic's F-84F and RF-84F, and is being considered for the new, super-sound F-105, Weba says. The company has also received inquiries from Lockheed Aircraft Corp., North American Aviation, Inc., and Canadian Ltd.

Coupling uses for which Weba is deriving its property, other than the 1 in., 1 1/2 in., 2 in., 3 in. and 3 1/2 in. sizes. The quick-disconnect employs an Weba's first company-developed steel. The new pressure products, such as hydraulic fluid, has been substantiated in tests made to exceed manufacturers' specifications.

## What It Will Do

One feature of the Weba coupling is that it can be installed without any tooling. Since packings are installed with an initial deflation, maximum O-ring life is assured.

To adapt the coupling to various types of fluids carried in aircraft, only the packing need be changed.

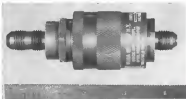
The unit can be hand-coupled while under 150 gpm pressure—either upon fastening call for only 60 psi. Manual uncoupling can be accomplished up to 1,500 psi, Weba says.

First loss of pressure at uncoupling is 0.13 to 0.15 psi per inch.

Pressure drop of the same coupling, (measuring 6 gpm at MIL-9-5606 fluid at 100 psi, 5 psi. Military spec allows 10 psi. pressure drop.

## Test Results

Tests were made with the coupling under conditions MIL-C-5162, performed in air. Coupling underwent proof pressure test at 4,500 psi for 30



**FOOTPROOF QUICK-DISCONNECT** cannot couple accidentally, says Weba firm.

sec. Operating pressure was 5,000 psi. Operating temperature limits were 275° to -61°.

Here are results:

- **Low-pressure leakage test.** Using a 30-sec. hydraulic head 15 mm. sealed to zero leakage (no visible trace of fluid).
- **High-pressure test.** At 150% of operating pressure (4,500 psi for 30 sec.) also gave zero leakage.
- **Pressure and vibration tests.** Coupling was subjected to 4,500 psi. last pressure at a rate of 30 to 45 gpm. while being vibrated at 2,000 gpm. at a double amplitude of 0.015 in. for 50 hours at room temperature (73°). Result: no significant leakage was detected within the range of 900 to 4,500 gpm. and the unit continued to operate with leakage.

At the request of Navy's BuAer, Weba ran the same test for an additional 275° oil total time (12 hr.) at 275°. Since no failure resulted the same test was continued for another 8 hr. at 275°. Coupling being well undamaged, test was discontinued.

- **Endurance tests.** Unit was coupled and uncoupled 200 times with five pressure of 15 psi applied to each half—no failure resulted. Second endurance test resulted in 100,000 couplings and uncouplings with no pressure and no lubrication at a rate of 20-25 couplings per min. Unit was functionally in good condition when it started from both mechanical and hydraulic standpoint.

• **Seepage flow test.** Coupling was subjected to flow of 500 cc/min. (20 gpm.) for 5-min. cycles in each direction, repeated 100 times. Inspection of coupling revealed no evidence of internal leakage and both disconnected halves gave zero leakage at both low

and high pressure tests.

- **Hard pressure test.** Internal pressure was built up to 7,500 psi. No damage or apparent distortion to body or sealing parts were evident. Packings showed signs of abrasion due to extension.

## Applications

In Republic's F-84F and RF-84F the Weba quick-disconnect is used in the power light control hydraulic return lines at the fuselage spool. Weba couplings are used in the fuel and oil lines of the installation of return lines as blocked the flight control system because of leakage.

A Republic engineer said that his company has recommended to the Air Force that these units be installed to its aircraft on its aircraft base. This is for airplane maintenance only, since ground crew can use the Aircraft quick-disconnect unit.

George Baker, Weba chief engineer, says in a preliminary Canadian jet aircraft, where all of the quick-disconnects are at the engine forward, the couplings would be used for various fluids at temperatures from ambient to 300°. Applications would include engine oil, fuel, engine oil return, oil cooler return, oil cooler return, APU fuel line, APU fuel line, fuel fuel line, hot fuel return line, fuel return return and oil tank case piping line.

Baker says the coupling is also suited to any pressure fluid line to ground not equipment use, as well as ground mobile hydraulic systems, and liquid petroleum rocket fuel systems. Units can be used when topping off fuel in jet engine.

Avitronics products made by Weba are a subcompact built include hydraulic re-



## H.S.S. milling cutters remove 44 CU. IN. chrome-moly in 40 MIN.

At FARMINGDALE, LONG ISLAND, Liberty Products Corporation, achieve outstanding results on a complicated profile milling job using OK Tool high speed steel inserted blade milling cutters. A single set-up of standard insert-bearing alternate angle, ball-edge and special chamfer mills take out 44 cubic inches of metal in the first time — the finish milling — of better than one cubic inch per minute.

Three pieces, 33 x 5 x 1 1/2, chrome-molybdenum steel, are softly beveled together using pilot pins to

spot locations. The job is completed in four operations as shown in the photographs. Number three Kearney & Trecker milling machines are used and the total time for all operations is 30 minutes, an average of 44 minutes per piece. Tolerances are held to plus or minus .005 inches.

This is another instance where high efficiency and economy are gained by correct job analysis and good judgment in the use of modern milling cutters on modern milling machines.



**FIRST OPERATION**—Green alternate angle system, three 15, three 15 and one 15 cut into 15 cut through three double end pilot pins, hold together.



**SECOND OPERATION**—The alternate angle system, three 15, three 15 and one 15 cut into 15 cut through three double end pilot pins, hold together.



**THIRD OPERATION**—Five double end pilot pins, three 15, three 15 and one 15 cut into 15 cut through three double end pilot pins, hold together.



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for modern milling machines**

THE OK TOOL COMPANY, INC., Milford, New Hampshire





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engine **P & W J-57**

Ignition **G. L. A.**

**GENERAL LABORATORY ASSOCIATES, INC.**  
Norwich, N.Y. New York

**GLA**

**AIRCRAFT IGNITION AND ELECTRONIC EQUIPMENT**

## WHO'S WHERE

(Continued from page 9)

Paul E. Bowles, U. S. also manager for British Overseas Airways Corp. in a new position of the airline's New York executive vice branch that absorbed the title of commercial manager and central command manager. Other changes: Boris W. Hickey, assistant to the vice manager; H. F. Gaud, assistant vice manager; George A. Janssen, sales development manager; and H. M. Clark, sales planning and traffic manager.

A. W. (Tony) LeVine, director of flight operations for Lockheed Aircraft Corp.'s California Division at Burbank. Herman B. (Fido) Nelson, new chief engineering test pilot.

F. W. Whitehead retired as chief production engineer of Bristol Aeroplane Co.'s Engine Division. Clifford W. Toman retired as sales branch engineer of the Aircraft Division.

L. B. Hickey, director of the new military relations department of Fairchild Engine & Aircraft Corp.'s Aircraft Division, Farmingdale, N.Y. Other department appointments: Stephen B. Jump, assistant director; W. H. Arns, Jr., chief of operations engineering.

E. A. Gaultier, C-119 project administrator at Lockheed Aircraft Corp.'s Georgia Division. He succeeded V. F. Gaud, who was transferred to the California Division to supervise duty. Other Georgia changes: W. H. Holsman, C-119 liaison group engineer; D. T. Papageorgis, B-7 liaison group engineer.

Jack L. Bowen, director of General aviation activities. Other changes: Jack Mow, director of all engineering facilities and jointly with Assistant Vice President Engineering; Gene D. Chalmers, of all aviation projects; Dr. Marvin Stern, liaison between General engineering and a group of scientific consultants.

Charles F. Dwyer, director of sales and traffic for Elco Aviation. Also reported: A. C. Hunt, assistant director of sales administration; T. W. Holmgren, assistant director of sales administration; W. T. Maxwell, Jr., assistant traffic director; C. R. Bennett, operations research assistant; W. L. Fowler, military sales manager; E. A. Smith, Jr., international sales manager; and William C. Grogg, military director of special flight projects.

William E. Mow, still assistant to the general manager of the Kansas Pacific Division of Kansas City, Mo., with other changes: Milton R. Hoffman, chief engineering; Carl E. Ovi, production manager; Howard G. Pank, director of quality; Francis Helms, Corp., Wichita, Pa.

Arthur Kramer, sales manager North American. Charles Pacific Airlines. He succeeded E. M. Feltz, who became sales and traffic manager for the Santa Paula and North Atlantic.

Arthur J. Hentley, assistant supervising engineer, Airframe Structures Laboratory, Inc., Memphis, N.Y.

J. H. Stinson, assistant sales manager, Midway Airlines Co., Detroit.

Alfred M. Nelson, technical specialist, American General Corp., Azusa, Calif.

*Sky Anchors Aweigh!*

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## New catapult and arresting gear gets them off and brings them back—safely

Tank forces from E. W. Bliss Company's Ordnance Division have been working closely with Navy officials in development, production and servicing of steam catapults and arresting gear.

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PRESSES, ROLLING MILLS, SPECIAL MACHINERY

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## NEW AVIATION PRODUCTS



### Spectrum Analyzer Hunts Noise

Developed to aid in industrial signal control, third octave spectrum analyzer BL-2109 works in frequencies of 55 to 15,000 cps. Using 27 band one-third octave band filters with associated low noise-high gain amplifiers, the instrument permits control in automatic switching, with data read from a raster or provided through level recorder Model BL-2304.

The recorder permits complete analysis of amplitude vs. each one-third octave band of frequencies with an overall level shown at the end of the filter stepping.

Broad Electronics Co., 3405 Parkside Ave., Cleveland 14, Ohio.



### Reformer Has Push-Pull Linkage

Solenoid actuator's linkage returns in either a peak or pull arrangement gives even motion with maximum friction reduced energy loss. The linkage design of the Model L12A magnifies the signal air gap movement in an 8:1 ratio.

Applications for the L12A include operation of mass filters, vibration generators, reciprocating motion, rotary stop motion, electric switches, release catch mechanisms and the like.

Cost spots are 1,769 shown, 7,400

terms, 45 v d.c., 0.035 amp, 1.5 watts. Stroke is 0.125 in. maximum, pull is 100 to 530 grams. Other coils for 12 and 24 v d.c. and for special voltages to 120 v. are also made.

Jensen Cunningham Sea & Co., Rochester, N. Y.

### Welder Uses Low-Cost Gas Shield

Filconac is a completely new automatic consumable-electrode welding system originally adapted for use with cold chills. It uses low-cost carbon dioxide shielding gas.

Aside from savings in gas cost, variable-arc welding permits substantial economies through use of inexpensive fixtures since no flux is needed and the operator can clearly see the arc.

Filconac processes has a very unique characteristic that enables you to make characteristic of the arc with inert gas or CO<sub>2</sub>, rate of electrode



consumable tube. Filing rod has a semi-conductive ceramic coating for thermal, electrical and mechanical reliability. The unit is made to conform with Ministry of Supply specs.

On moving an initial impulse from the high-frequency unit, a small path is formed, through the carbon deposit, if present, across the face of the semi-conductive ceramic. The latter has a negative temperature coefficient, thus the resistance of the path immediately drops with temperature increase and the whole mass of electricity stored in the high-frequency unit is quickly dissipated in the form of an arc across the spacer tube.

R.L.G. Sparking Plugs, Ltd., Putney Vale, London, S. W. 15, England.

### Timer Is Self Re-Coiling

Repetitive amount changes are produced automatically by Model S44 cold cathode-tube electronic timer, with load current consisting of about 60 milliamperes and 60 volts. Time between delays can be adjusted from 0.01 sec. to 24 sec.

Unit measures 3 1/2 x 1 1/2 x 1 1/2 in. No warm-up time is needed and there is



been off delay switches work-level speed and the arc length remains constant, the timer reports.

Equipment includes wire feeder, torch, control panel, and solvent seal switch-generator unit. High wire feed speeds are used-up to 1,500 in./min. Sheet are brought are stated to produce deep penetration with a maximum of spatter. All position operation is and to be possible.

General Electric Co., Woking Dept., York, Pa.

### Surface-Discharge Igniter for Jets

A surface-discharge igniter operating at controlled breakdown voltage overcomes problems of scattering jet pre-ignition delay and spark gap fouling, the British manufacturers reports.

Igniter consists of an inner (hot) and outer (cold) electrodes, in the form of an anvil, separated by a

no power consumption when the train is in the electric, the maker says.  
**Farnes Electric Co., Waukegan, Ill.**



#### Actuator Handles High Torque

The patented actuator for aircraft, particularly adaptable to missiles, can take ultimate loads up to 17,000 lb. and maximum operating loads of 12,000 lb. lb., the manufacturer reports.

Feature of the Series 249 actuators is their small size. Largest size in the line has complete dimensions of approximately 11x14x1 in.

Wide output range is said to be possible using nonadjustable gas stages without changing the basic configuration. Gas stages are from +8.3 to 7,500,000 lb.

As integrated load heater de-icing into the main when output load exceeds a predetermined value, upon relief at the involved it re-energizes the actuator to complete the stroke. Load limits are extremely adjustable.

**Leas, Inc., Grand Rapids Division, 150 Johns Ave., N.W., Grand Rapids 2, Mich.**



#### Multiple-Purpose Test Stand

Combination test stand providing hydraulic, electric and pneumatic services for ground check of aircraft is being used by many major aircraft manufacturers, according to the manufacturer, Glen Hydraulic, Inc., New York International Airport. Grounding engine drives a 20-gpm. hydraulic pump a 200-amp. d.c. generator and a low pressure pneumatic compressor. A shutoff arrangement allows services to be used individually or simultaneously. Latest version of the test stand, now being built, will incorporate 30-gpm., 1,000-psi hydraulic circuit, 15-hp. a.c. and 300-amp. d.c. power, and 5,000-psi pneumatic system.

#### ALSO ON THE MARKET

Electric firing truck's forks extend out and to pull up loaded pallet, raise it over the vehicle to insert into the vehicle. LaunchMaster's capacity is 2,000 lb. Launch to 10 ft. long can be loaded.  
**—Lewis-Skippard Products, Inc., Watertown, Mass.**

Nylon wires, nets and belts are self-locking, non-corrosive and maintaining weight built as much as aluminum fasteners, and can take maximum load to 320 P, the maker reports. Tensile strength as up to 15,700 psi—Nylongrip Products, 449 Watertown St., Newton 55, Mass.

CT600 series three-type Speed Nuts can accommodate Type A or Type B (2) add tapping sheet metal screws. Previously, separate fasteners were needed for each type screw, the manufacturer reports—Transman Products, Inc., Cleveland, Ohio.

General purpose wire, reported to withstand temperatures from -90 to 400F, is designated Type 150. Wire meets USAF MIL W 8777—Electronic Arts, Inc., Waukegan & Cable Division, Fort Worth, Texas.

Automatic lead screw tapping machine ATU No. 3 is a self-contained, electrically controlled and operated device for single and multiple specific tapping or threading. Said to require an incoming motor, the unit has an external drive.

control allowing tip depth to be made to within one-quarter inch within the maximum 10 in. stroke—Bosch Tool Co., Inc., 594 Johnson Ave., Brooklyn N.Y.

Self-contained hydraulic stretch press with 11-in. stroke and 24 in. x 12 in. bed area lists at \$8,750. Larger and smaller sizes are available—Mechonics Inc., Muskegon Airport, Bridgport Conn.

Hydraulic pull gun, Model 125 drives in and 1/2-in. Hacksblat Pull expander is 1,000 lb. at the nose end, working stroke is 1/2-in.—Hack Manufacturing Co., 2450 Bellevue Ave., Detroit 7, Mich.

Carbide tool sharpening machine has built-in dust collector. Machine has top loading edge with reciprocating motion in four directions in a vertical plane—Wickman Manufacturing Co., 10125 Capital Ave., Oak Park De troit 37, Mich.

Die/cut fine pitch hole for cutting gear with a diametral pitch of 20 to 60 in 120 are available in three diameters of .015, .075 and .120—Thomas Tool Works, 2301 N. Keller Ave., Chicago 39, Ill.

Microscopic measuring materials bonded with epoxy resin for electric measuring systems—Microscopic Materials, 1000 E. 1st Ave., Minneapolis, Minn.

Metal plate with preperforated holes, Met-Chek has application in non-plastics, drill and pipe tapping—Caldwell Corp., 415 E. Beach Ave., Highland, Calif.

Model 610 Rayometer displays counts to 1,000 per minute to a remote unit showing point, using low or low voltage. Unit counts to 999,999—Kaiser Corp., 127 Harbor Blvd., Belmont, Calif.

TA-10 S saws, cuts or strips is installed with at both ends and can be used to cut, trim, or strip. Unit also works identification codes. Price is about \$5,500—Aries Engineering Co., Milwaukee, Wis.

Hollow rail for shoring soil materials, with in addition, can be used on closely spaced transverse piers as a support structure, the manufacturer states. Series will clean trench lines at 10 to 12 in. diameter—Woodward & Lothrop Co., Inc., 355 Lincoln St., Hingham, Mass.

Field-tested "quiet room" is a sound-proofed quiet room designed to meet

## lube oil transfer pumps...



### Pesco units perform under critical conditions on giant planes



Model 11310P Pesco Hydraulic Pump is used to lubricate engine of DC-104 DC-8A. Photo shown is provided by a Pesco Sales Office.



Model 0125M Pesco Hydraulic Pump, driven by a Pesco Hydraulic Motor, is employed on Conquistador and Super Constellation model airplanes.



Model 11310P Pesco Hydraulic Pump is the standard motor-driven transfer unit for Conquistador and Super Constellation model airplanes.



The CRF and 8-277 pumps only on the Model 11310P Pesco Hydraulic Pump for dependable lube oil transfer under all conditions.

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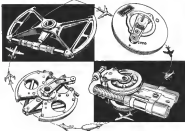
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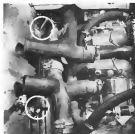
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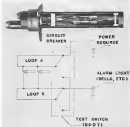
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## AVIATION CALENDAR

- June 22-24—Aviation Distributors & Sales Engineers Assn., Silver Anniversary meet. at the Beverly Hills Lodge, Beverly Hills, Calif.
- June 22-23-11th Joint Transfer & Trade Conference, Seattle, University of California, Los Angeles.
- June 23-25—Institute of Navigation, 13th annual meeting, Myrtle Beach, Ala.
- June 26-27—College of Aeronautical Technology, 26th annual homecoming and reunion, St. Louis.
- June 27-28—National Airshow, Committee for Aeronautics, National Inspection of Army Aeronautical Laboratory, Moffett Field, Calif.
- June 27-29—American Society for Testing Materials, 19th annual meeting, Graduate-Hotel, New York City.
- July 1-2—Boeing Pacific Assn., annual meeting, Los Angeles, Calif. (Boeing Pacific Assn. for Air National Guard jet pilots, Los Angeles to Detroit).
- July 2-3—Second annual Western New York Air Show and Race, Oswego Airport, Oswego, N. Y.
- July 3-4—International Airshow, Exposition, Detroit.
- July 24—North annual All Women Transcontinental Air Race, Long Beach, Calif., to Springfield, Mass.
- July 2-4—First annual National Science Council, Harte Hall, Kansas City.
- July 3-5—Office of Naval Research and Ryan Aeronautical Co., international symposium on solar, radio and space wave propagation through ionized media, Navy Electronics Laboratory, San Diego.
- July 11-12—Special seminar program on aerodynamics of turbopropellers, Mass. aircraft Division, of Technology, Cambridge.
- July 22-24—Western Plant Maintenance and Engineering Show, produced by Clapp and Foland, San Francisco, Anaheim, Los Angeles.
- July 18-24—Philadelphia, Color Council, annual open house, Philadelphia Convention Center, Philadelphia, Pa.
- July 21-23—Aviation Helicopter Congress, Southampton, The Netherlands.
- Aug. 5-7—Experimental Aircraft Assn., third annual fly-in and Convention, Gates-Wright Airport, Melbourne, Fla.
- Aug. 8-10—Institute of the Aeronautical Sciences, annual National Turbine Engine Air Transportation Meeting, Chicago, Ill., Seattle.
- Aug. 11-13—Air Force Assn., Convention and Aerospace Products, San Francisco.
- Aug. 15-17—Society of Automotive Engineers, West Coast Golden Anniversary Meeting, Hotel McManis, Portland, Ore.
- Aug. 22-23—Symposium on Electronics in Automatic Production, sponsored by Stanford Research Institute and the National Industrial Conference Board, Stanford University, Stanford, Calif.
- Aug. 24-25—Western Electronics Show and Convention (WESTCON), Civic Auditorium and Fremont Hotel, San Francisco.
- Aug. 26-28—International Space Conference, conducted by Scientific Division of Radio Avionics Corp. Secor, N. Y.
- Sept. 13-15—Twenty-ninth National Aircraft Show, Philadelphia International Airport.

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## Senate Investigates German Bilateral

U. S. carriers protest granting unlimited rights to Lufthansa for New York-Latin American service.

By Craig Lewis

Washington, D. C.—The bilateral air transport agreement negotiated between the U. S. State Department and the West German government created as the subject of an emergency Senate investigation after it met with widespread protests from U. S. carriers.

Final signing of the document has been held up while the Senate Interstate and Foreign Commerce Committee, headed by Sen. Warren Magnuson (D-Wash.), goes into the details of the agreement and the manner in which it was negotiated.

Key to the protest of U. S. carriers was the granting of unlimited rights to the Lufthansa for service beyond the United States to the Caribbean area and South America.

American carriers made their protest and Sen. Magnuson announced his investigation when it became known that the negotiators had signed on a bilateral which would give a German airline the following routes:

- From Germany to New York, London and Philadelphia.
- Unlimited rights beyond these points to Caribbean area and South America.
- Germany to Chicago via Canada.
- Transoceanic route from Germany to other San Francisco to Los Angeles.

In return for these routes, American carriers—Pan American, Western Airlines and Trans World Airlines—would give the Germans their routes that are now scheduled to serve, plus unlimited rights beyond Germany.

### Signing Contested

The controversy arose as the result of the U. S.-German meeting earlier this month (AWJ June 13, p. 11). The American delegation was headed by Civil Aeronautics Board member Elias Gurnea, and the German group was led by Dr. Karl Koplin, chief of the Aviation Department. The meetings were attended by Paul Richter of the Air Transport Users' acting as an observer.

After four days of negotiation, the parties agreed on the final form of the document. When the U. S. action committee of the parties met to approve, they objected to the State Department, the White House and Congress. Sen. Magnuson announced that

he would hold hearings on the matter, and the State Department promptly canceled plans to sign the agreement at the end of the month of negotiations.

At the Senate hearings, State Department, CAB and maritime action appeared to comment on the agreement. Sen. Magnuson announced that the committee would determine whether the agreement and the content of its negotiations carried out the policies of Congress.

Magnuson said the primary question was whether international competition caused abandonment of the principle of trading past recognized rights.

### U. S. Defense

Testimony for the State Department, Deputy Assistant Secretary Thomas V. Kolpa defended the agreement as a sound document and said that the U. S. would like to sign it early next year. He warned that Germany might have more serious thoughts about the agreement.

Kolpa pointed that within the past two distinct phases, Germany is going to be the third great air power in civil aviation. The American government lacks a strategy to establish civil air relations with Germany based on the Bernadine principles established in the bilateral agreement with Great Britain, he said. Under the Bernadine principles, airline operations are governed by business judgment, rather than government restriction.

Kolpa also pointed out that a major consideration in the negotiations was the fact that there have been no airlines in Germany, and therefore in Europe, relating to clearing of the European area and a network of air routes within Europe. He said that "our own airlines would take a terrific beating if such an agreement took place."

Stewart G. Tipton, ATA general counsel, told the committee that the carriers have urged close consultation on negotiations of bilateral agreements. He pointed out that delegations of foreign governments as negotiators also represent the foreign airlines involved due to predominant government ownership of foreign carriers. Tipton urged that the State Department rely more heavily on the experience and judgment of U. S. carriers.

Tipton said that the carrier con-

sented in granting of routes to Latin America had no knowledge that such routes were needed in discussions until a few days before the agreement was reached and that the State Department failed to consult with the carriers.

Major objection to the route granted Germany were Eastern Air Lines and National Airlines. Alexander G. Herby, NAL senior vice president, told the committee that the rights granted for Latin America were without precedent. Herby pointed out that in the recently issued Bilateral document, CAB found that a Pan American Eastern interchange would offer too much competition for National and Brazil Airways. Herby predicted that the competition of single phase service to Latin America by a German airline would cost the Americans to pay a "taxation" rate.

Herby also said that the concessions to the Germans set a bad precedent for negotiations with other carriers, that the unrestricted rights granted Germany will also have to be granted to others.

Robert Rumpel, vice president of Eastern Air Lines, said he thought the State Department is so absorbed in overall international problems that it is overlooking the economic facts of life. He felt that the agreement could only be confined to a single point in the Caribbean and not in South America.

### 'Concessions Justified'

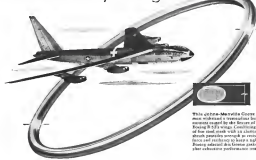
Both Herby and Rumpel suggested that the investigation make a general investigation of bilateral negotiations.

Trans World Airlines agreed, though vice president Thomas K. Taylor, that the agreement be concluded as soon as possible and that the contemplated service be inaugurated. He told the committee that the German concessions were not in part as those accorded the British and French, but that the concessions are reflected in view of the fact that these three countries are the leading world markets.

Taylor pointed out that travel to South America via New York would be restricted by equally positions at the bilateral agreement.

Donald Murray Gordon Robert A. Schneider said he thought a good agreement could be reached with Germany without a South American route. He pointed out that Brazil is still trying to effect an interchange service between New York and South America while a German carrier has been awarded a single phase service.

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## Senate Unit Increases CAB Budget for 1956

Civil Aeronautics Board's fiscal 1956 budget for administration and maintenance was increased \$27.2 million over the House-approved allocation by Senate Appropriations Committee.

The committee's action:

- Increased the Board's administrative funds to \$4,137,000, the \$4.1 million requested by CAB. This is \$225,000 more than the House approved and \$145,000 more than the Board's fiscal 1955 allocation.

- Increased funds for subsidy payments to airlines to \$85 million, \$15 million more than the House recommended, and \$6.1 million more than the \$48.9 million provided for fiscal 1955. Observing that its proposal falls 50 million short of the \$65 million asked by CAB, the committee said the Board "can now well require provision of a supplemental appropriation in the next session."

## CAB Settles Braniff's Route 106 Case

Dispute over Braniff Airways Route 106 has been finally settled by Civil Aeronautics Board in a decision which gives the local service route to Chark Airlines and adds certain points to Braniff's routing.

In the third decision issued on Route 106 in less than six months, CAB decided to:

- Preserve Route 106 as a local service by adding it to Chark's Route 107.
- Rejected the contention of United Air Lines for service at Fort Dodge, Debouque and Rockford.

The Board said that the latest plan will result in an increase in subsidy support, but it maintains that the route is warranted by the improvement in service to the points involved.

The Board said that it is better to have "a willing and enthusiastic local service carrier available to provide a service which United would provide only grudgingly under compulsion."

Joseph P. Adams, CAB Vice Chairman, disagreed with the majority decision on the grounds that the provision causes competition. He also held that the needs of the cities involved—Fort Dodge, Mason City, Debouque and Rockford—has tripartite service has been agreed by the airports.

Adams says that the new decision represents an abandonment of a reasonable subsidy policy. He fears that the new plan will mean additional subsidy orders of \$500,000 or more.

In his dissent, Adams feared awarding of Route 106 to Chark if a change is to be made.

**PEARL HARBOR 5-15 HELICOPTERS** Inquire, before Heligan Airlines' new Hawaii routes made from Honolulu to Hialeah, Hawaii, on Saturdays, Hialeah. The airline will operate three daily roundtrips using the Beechcraft, Geneva officials say the new helicopter route may well be expanded to Oahu, Maui, and

## Navigation Aid Funds Reduced \$7 Million

Senate Appropriations Committee cut \$7 million from Civil Aeronautics Administration's fiscal 1956 fund for the new navigational facilities because of the uncertainty as to the ultimate coming system used by the DME-Tacan dispute.

The \$16 million approved by the Senate committee for establishment of new navigational facilities during the coming fiscal year is \$2.5 million less than the House-approved amount.

Other action taken on the fiscal 1956 CAB budget were:

- Approved aid in approving \$28 million—the amount also approved by the House—for federal aid for airport development, the committee explained that it was refraining from proposing an even higher figure in view of the fact that the Senate Commerce Committee has legislation pending the Airport Act under consideration (AW June 15, p. 111).

- Traffic regulations. The committee increased funds for the operation of facilities to \$187 million—\$975,000 over the Administration request and \$4.1 million over the House figure.

The total \$162 million CAB budget approved by the Senate committee is \$2.4 million over the House-approved figure and \$2.5 million more than proposed by the Administration.

## CAB ORDERS

### GRANTED

Lufthansa permission to serve New York Florida through the International Airport. Lufthansa to continue in New York Florida, proceeding to City of New York, Ohio, Rochester, N. Y., Chamber of Commerce, Raleigh, Durham, N. C., Airport Authority, and the City and Chamber of Commerce of Raleigh, Durham, N. C.

Norfolk Airlines permission to serve Newport, Va., through the Newport Municipal Airport.

Flying Tiger East on exemption to pre-

serve two round trips between Fairbanks, Alaska, and New York, permission to a round trip with Fairfield, Part No. 1 of the American Legion. Action on one other proposed flight is deferred.

Permission to operate in the Erie-Detroit service case to City of Detroit and the Detroit Board of Commerce; American Airlines, Capital Airlines, Colonial Airlines, Norfolk Airlines, and United Air Lines. Permission of the Committee of Lufthansa and Lorraine, Pa., to extend, and the extension of Lake Central Airlines is deferred to meet Lake Central has been made a party to the case.

Panama Association Corp. an exemption to permit them to operate their charter flights between points in the United States and Canada.

Permits for Port Authority have to be issued in the proceeding involving the application of Lufthansa Airlines Corporation, S. A., for a foreign air carrier permit.

American Airlines is exempted to transport property only between Colorado, Mexico and other points on its scheduled route on a non-scheduled basis.

### APPROVED

Agreements between Capital Airlines, Trans World Airlines, and other airlines relating to interconnecting arrangements.

Resolution between various carriers adopted by the International Air Transport Association, relating to postponement of scheduled flights by Canadian Pacific Airlines, Ltd., and Aeroline Nacional de Colombia S. A.

### ORDERED

Control Airlines' mail pay for the period Sept. 15, 1955 to Dec. 31, 1954 be paid at \$1,713,665.

Permits for Lufthansa to show cases why the CAB should not set a temporary and rate of 45.0 cents for the period starting Aug. 5, 1955. The new rate will increase Lufthansa's annual temporary and compensation to \$1,017,167.

### DISMISSED

Seaboard and Western Airlines' application for an exemption to perform a one-way oceanic flight, at the request of the Coast.

Seaboard Air Transport's application for a certificate of public convenience and necessity, by which it could a CAB before adding of the carrier would be granted with the application was returned marked "reconsidered."

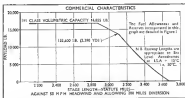
# Prototype Comet 4 Tests Design Changes

London—De Havilland has announced new details on the Comet 4 jet transport, available for delivery in 1958, while the production line at the company's Hatfield plant are beginning to move modified Comet 1s for delivery to the Royal Air Force.

Meanwhile, more than 100 hours of unpowered flight tests have been completed on the Comet 3, a prototype airplane for the Comet 4. Tail drugging sleds have been made at 110,000 lb gross weight, rising about 4,500 lb at cruise. Top speed so far has been indicated March 335.

Important features on the new Comet 4, in addition to those incorporated as a result of modifications to the Comet 1, include:

- Four Rolls-Royce Avon R.A. 29 engines with 12,180 lb static thrust for takeoff, an increase of 500 lb, as compared with the Avon R.A. 25 engines in the Comet 3. Specific consumption of the new engines is reduced about 5%.
- Fuel capacity increased to 10,500 gal.
- Maximum skin thickness of 15 gauge.
- Thicker wing skin in the critical areas such as wheel exhaust.
- Redesigned rear gun boom which has been fatigue tested for four weeks.
- Location of the control fuelcock moved from the present level of 10 ft above in yet to be decided. Pilot's escape on the old Avon Registration Board hasn't used a director jet.
- Position of the fuel vent changed to



prevent any chance of fuel stepping down into the jet exhaust.

• Hoses and valves redesigned to prevent icing.

• Stricter refueling procedures.

• Maximum weight of 151,160 lb, an increase of 2,100 lb over the Comet 3.

Even tests made with the Comet 3, de Havilland reports the Comet 4 will be capable of carrying its capacity payload of 16,500 lb (11,800 passengers) over a stage length of 2,670 miles against a constant headwind of 50 mph. This, says de Havilland, means realistic fuel reserves including allowances for 10 min. standstill at 1,000 feet followed by a duration of 300 miles from sea level.

What a discussion is not necessary there is enough fuel for a total standstill time of 1 hr 22 min at 1,000 ft or 1 hr 34 min at 20,000 feet, plus 15 min at 1,000 feet.

Flight weight including radio, pitot, engine, doors, navigational equipment, etc. is 58,800 lb. This is based on present design, but as it turns out becomes increasingly available de Havilland hopes to incorporate it to save on structural weight.

## Reverse Thrust

De Havilland also notes about its other development the Comet 4 although present design makes no allowance for that. Maximum landing weight is 113,000 lb.

During flight tests, the Comet 3 has taken off at 1,400 miles of gross weight with 178,800 lb gross load, tail drugging all the way, a considerable improvement over the Comet 1, which had a critical angle of attack at takeoff. De Havilland figures it can perform tail-dragging take-off at this load at 28 knots unpowered without experiencing any trouble.

With the increased power of the Comet 4's Avon engines, the takeoff performance despite the greater gross weight caused by the higher engine

capacity will be somewhat better than that of the Comet 3, de Havilland says.

The performance design factor for stage load of the Comet 1 was 2.5, with great test to 2.8 times normal operating level, and with all production models tested to 1.5. The same requirements are planned for the Comet 4.

## Cruise Patterns

The new Comet will cruise at 35,000 to 45,000 feet at a penetration of 51 ps. compared to 41 for Comets 1 and 2. The manufacturer believes the Comet 4 will be good for 10 radian turn rates per year on 1,000-hour missions.

Climax cruising speed of the Comet 4, the company asserts, should be Mach 0.78 or 480 mph up to 584 mph.

Considering 15 minutes for each landing and 45 minutes on the ground for each intermediate stop, the Comet 4 is expected to make the 1,162-mile flight between New York and London with capacity payload and six reserves, making stop in 9 hr 30 min. The 1,612-mile London flight from New York to San Francisco could be made in 5 hr 35 min, de Havilland figures. The 13,164-mile flight to Seoul, Korea, with four intermediate stops at 27 hr 37 min, and the 6,210-mile flight London-Bombay, with stops at Cairo and Nairobi in 17 hr 23 min.

With the great amount of data received on fatigue testing at the Comet, de Havilland is convinced that it now knows more than any competitor about the philosophy, methods and techniques of designing against fatigue.

One result of the test: the skin of a 4-ft panel along both sides of the



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### Douglas DC-8 Transport Model

Douglas Aircraft Company model of a new DC-8 jet transport shown extensively close resemblance to Antonov An-225, which's design was approved November 21, 1973 by VDO. The DC-8, powered by four Pratt & Whitney JT70 and scheduled to make first flight in December 1977, is one of the jet transport competitors with the Conquest.

Conquest 2 fuselage has been changed from 22-gage to the heavier 19-gage. Square windows and escape hatches have been reconfigured to Helt-Ton, oval which will be strengthened in the addition of 10-in. x 16-in. 26-gage, double flange around each corner reinforced by the 14-gage flange of the window frame itself.

Around the windows and escape hatches, such have been moved 4 to 5 in. farther back from the exterior. Hatches are slightly more widely spaced and spread out into the double plate area in wall.

During last fall's court of inquiry into the causes of the Conquest disaster, it was brought out that in actual shop practice, rivet holes occurred closer to the center than the design office specified. The object in moving the rivets farther from the edge of the rivet hole is to reduce the cumulative local stress raising efforts of the corners and to concentrate any possible distortions that may occur in actual practice.

### Smaller Windows

Window frames on the modified Conquest 2 and probably that of the smaller and are also heavily riveted with two complete lines of rivets. The Conquest 2 has a single line of closely set rivets in conjunction with window bonding to mount the window frames to the skin. The redesigned window frames of the new design have been redesigned with two complete lines of rivets in conjunction with window bonding to mount the window frames to the skin. The redesigned window frames of the new design have been redesigned with two complete lines of rivets in conjunction with window bonding to mount the window frames to the skin.

the heat of these tests of 150,000 hours.

More comprehensive tests will come later this summer when a modified Conquest 2 goes into the water tank for full-scale testing incorporating not only pressurization cycling but actual plus gust wing loading as well.

The Helt-Ton has a water tank under construction at Helt-Ton. In addition, the firm is considering simulation of the multiple vibrations and oscillations that occur in actual flight but were not fed into the tank at Helt-Ton.

## Transport Tests Win Approval

Legislation re-authorizing a \$12.5 million program for the testing of new transport aircraft was quickly approved by Senate Commerce Committee after both Commerce Department and Civil Aeronautics Board agreed to enactment.

The program, authorized in 1968, is due to expire Sept. 30. It has never been reauthorized. Senate Budget Committee, once and House Appropriations Committee, twice, refused funds. The reauthorization would continue the program until Sept. 30, 1978.

Rolling out that the U.S. is now "on the threshold of a vast program of development in transport and jet-powered aircraft, and at the same time the economic need for new and improved local service transport aircraft and transport helicopters grows more acute." CAR Chairman Ross Barker doubted that \$12.5 million in government aid in testing is adequate. In a letter to Senate Commerce Committee Chairman William McGowan, he said:

"This type of assistance becomes available only after the aircraft has

## New Flight Crew Duty Time Limits Proposed

Proposed crew flight time limitations which embody new concepts of duty time have been issued by the Federal Aviation Regulation of the Civil Aeronautics Board.

The FAR proposes a sliding scale of time limits which takes into consideration gross time as well as flight time. It also proposes a 65% schedule reliability standard.

Under the plan, a carrier would be prohibited from scheduling a flight crew member more than 140 hours when duty time is eleven hours.

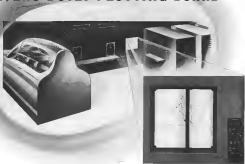
The flight time limit would be eight hours when total duty time is more than eleven hours, but not more than fourteen hours, and a six-hour limit would apply when duty is fourteen to sixteen hours.

It would be assumed that the last hour of duty assignment within any 24-hour period would be required for flight planning. Increasing rest period between assignments would have to be twice the number of hours of total duty time since the preceding rest period, and not less than eight hours.

A flight crew member could not be scheduled for duty shift of less than 12 hours, provided 12 hours in any seven consecutive days, 100 hours in any month and 1,000 hours in a year.

In scheduling assignments, carriers would have to take into account both hours in assignments and for carrying out intermediate periods involving weeks and airplane crossing speed.

## ATLAS BUILT PLOTTING BOARD



## Scoreboard For Tomorrow's Pilots

This plotting board designed by Mitrop Inc.—a subsidiary of the new U.S. Air Force supercomputer for F-105A planes—is another example of Atlas manufacturing expertise at work. Atlas specializes in "precision plotting" electronic assemblies from the pilot stage to production efficiency. Facilitates the practical engineering step and the facilities between the idea and the production line.

Bring your electronic-mechanical design to us. Our design, production and methods engineers,

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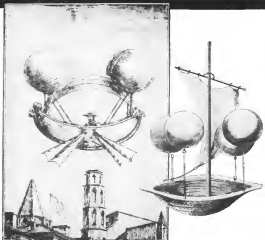
"From Drawing Board... to Production Line"



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## Lana's Flying Boat



Of the many ways by which men have tried to fly, here is one of the stranger. It involved pumping all the air out of three copper globes attached to a boat-like car. This aerial chariot was designed by Francesco Lana in Italy about 1679.

What Lana did is known as the aerial piston and density of air, or he might have seen his error. Both of these were discovered two years later. Even so, the idea still attracted attention nearly 200 years afterwards. In fact, a Frenchman,

Monsieur Monge, actually built a machine from Lana's plans and tried vainly to fly it in 1840.

We may smile at Lana's flying boat now, but it was one of the first and one of the last. Today ESSO research, which has played an important part in the development of supersonic aviation, petroleum products since the dawn of powered flight, is continuing to seek new and better ways to help men fly.

Another reason why most operators prefer

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## Seaboard, Still Uncertified, But Gains

By Gordon Conley

Seaboard & Western Airlines' air-freight and charter business is nearing its peak. *Pacific Airline* volume despite handicaps inherent in S&W's irregular operations. With a certificate to fly scheduled all-cargo service across the Atlantic, Seaboard believes it could double this volume.

"That's an extremely conservative estimate," Executive Vice President Arthur V. Norden told *log week*. "If it's the very least we could do during the first year of scheduled operation."

Seaboard sided for an all-cargo certificate when it started working seven years ago. A majority of the Civil Aeronautics Board approved the airline's petition last summer, six months after CAB Chairman Herbert Brown and S&W's Board of Directors approved the application. The Transport Canada Civil Board proposed a five-year certificate without subsidy.

The Board forwarded its recommendations to the White House, where the case still is gathering dust (AW June 13, p. 11). On the other end of the scale is *Aerowest* Ltd., a trans-Atlantic all-cargo certificate, approved by President Eisenhower 10 months after the British airline filed its application. To compare service, *Aerowest* was forced to lease DC-6's from *Stech Aviation* and DC-4's from *Transwestern Air Lines*.

"We're optimistic," Norden says. "Of course we've been optimistic for years. But ours is the only airline route ever left in the White House. I think it should come out pretty soon."

## Built-in Handicaps

When Arthur Norden, his brother, S&W's President Ray A. Nielsen, and three other Air Transport Command pilots of World War II founded Seaboard & Western, they hoped to win authority for scheduled flights in one or two years.

"We didn't go into business to be an irregular carrier," and the executive vice president. "There was no way built-in handicaps in a scheduled operation." These include:

• **Irregular flights.** "This type of operation doesn't hold much track to the potential customer and doesn't produce the kind of business we'd have with a regular schedule."

• **Average public opinion.** "Many shippers just won't do business with a non-track. That business would be dropped automatically if we were a regular."

• **Air freighter restrictions.** "The boarders are prohibited by CAB from doing business with irregular carriers. They also give us a limited amount of



SUPER CONSTELLATION 1049D provides free and all loading for S&W's North Atlantic flights.

shippers if they act as agents. This is what is commonly known as tank discrimination."

• **Limited growth.** "By the end of 1948, we'd grown to a point where we were almost to run out of fuel in the West. With more volume, we'd be buying the limits of an irregular operation."

Seaboard broke through this fence with a "left-handed certificate" to fly a total of 73 scheduled round-trip flights, 12 each to Western Europe, the Middle East, the Far East, South America, North Africa and the Caribbean.

Under the limited schedule, commercial airfreight on all flights is restricted to 40% of the total payload. The rest must be government cargo.

"In other words, if we don't have the proper goods and have run out of irregular flights, our shipments can't take off," said Arthur Nielsen. "But the authority has given us some degree of regularity."

## Steady Gains

Despite its handicaps as a non-scheduled airline, Seaboard's gross operating revenues increased steadily from \$560,000 in January to \$1.5 million last month. Total for the first five months of this year was \$3,720,300.

If S&W continues at this rate, the 1955 gross should reach near the carrier's peak of \$1,618,731 for 1953, of which more than half represented a cargo from the Pacific Airlift. Net profit for the second year totaled \$151,173.

During 1954, operating revenues dropped to \$8,466,142, and Seaboard reported a loss of \$399,897 for the year. The airline said the deficit resulted from the loss of Pacific airlift services early in 1954 and the cost of training flight crews and technical personnel to oper-

ate four Lockheed 1049D Super Constellation delivered last year.

Seaboard gains in airfreight are responsible for the greater part of Seaboard's increased revenue. The airline flew 2,333,150 ton-miles during the first quarter of this year, topping the same period last year by 55%.

Other sources are from a government contract to lift military personnel and dependents between the U.S. and military installations in Western Europe. The contract was awarded last October and renewed for another half year in April. Total revenue for each month period: \$13 million.

For its charter flights, S&W's contracts as Super Constellation to 91 passenger airlines. All passenger flights carry two stewardesses and a registered nurse.

"Even if we get the trans-Atlantic certificate," Norden said, "we'll continue to operate military charters until it becomes more profitable to carry only freight."

## KLM Viscounts

London-KLM Royal Dutch Airlines ordered two Boeing Viscount 440s from Viscount-KLM's last week, the last order preparation for a British transport builder of U.S.-equipped European airlines (AW May 23, p. 6).

The \$112 million order was an unusual choice after *Carlson Airlines* Administrator Fred E. Lee formally selected the Viscount during commercial tests.

KLM was the second airline to order the short-range, high-speed 900. But all European airlines earlier placed a 23-passenger order with Viscount for the new version. The Dutch order exceeded total Viscount sales to date to 215.

# Airline Traffic—January-March 1955

DOMESTIC TRUNK	Revenue Passenger	Revenue Passenger- Miles (1950)	Revenue Passenger Load Factor	U. S. Mail Revenue	Express Revenue	Freight Revenue	Total Revenue Passenger	Per Cent Revenue to Available Seating
American Airlines	1,370,318	991,934	68.74%	4,066,800	8,491,615	14,719,373	113,587,168	39.68
Boeing Airways	374,919	138,182	68.86	435,701	506,708	569,940	14,684,126	55.89
Capital Airlines	945,453	164,303	34.35	876,574	683,873	903,427	15,147,481	61.62
Continental Airlines	90,365	36,345	40.23	40,395	11,591	11,591	2,738,054	56.33
Continental Air Lines	508,974	49,330	30.90	158,235	32,390	846,541	4,381,564	44.52
Delta-C & S Air Lines	518,754	250,729	48.55	814,294	584,887	1,418,892	80,098,093	57.56
Eastern Air Lines	1,020,609	519,283	67.46	9,406,467	1,213,393	3,048,458	101,725,912	53.35
Norfolk Airlines	388,894	878,781	47.88	848,999	706,440	1,024,637	30,004,470	63.61
Northeast Airlines	94,475	183,101	32.81	33,248	35,767	33,955	1,679,132	59.84
Norfolk Airlines	544,191	148,899	31.37	615,076	548,291	1,891,894	17,645,404	40.67
Tam World Airlines	790,303	554,603	57.81	3,183,383	1,703,859	5,364,892	69,445,708	53.99
United Air Lines	1,501,139	790,171	65.25	6,033,716	8,791,636	8,703,632	93,549,390	54.63
Western Air Lines	838,408	110,799	53.37	630,877	173,872	418,796	17,686,169	54.32
LOCAL SERVICE								
Allegany Airlines	36,501	9,001	48.05	16,999	34,819	—	911,168	42.87
Boeing Air Lines	30,553	3,565	18.58	5,469	5,601	8,798	538,312	53.48
Central Airlines	21,332	3,345	55.33	19,035	4,868	11,505	369,140	53.81
Frontier Airlines	36,878	10,427	43.64	30,836	16,899	104,264	1,188,000	51.68
Lake Central Airlines	10,809	8,741	29.65	5,808	23,656	—	584,714	38.83
Melrose Airlines	30,899	8,091	34.44	70,477	14,213	14,285	892,014	54.22
Nash Central Airlines	70,353	11,490	44.50	45,490	41,693	—	1,119,006	60.81
Oak Air Lines	41,899	6,649	23.81	14,964	97,181	—	565,719	34.33
Eastern Airlines	47,396	75,335	43.71	92,267	99,240	30,732	1,341,236	43.49
Pennsylvania Airlines	45,649	11,304	51.60	35,491	24,549	36,327	1,217,735	47.78
Seafair Airways	30,944	6,189	38.83	92,569	84,660	—	631,812	36.87
Southwest Airlines	54,680	10,048	53.42	10,575	13,551	31,746	1,093,346	53.43
Texas Air Service	34,121	8,285	47.13	38,754	15,548	85,526	744,432	34.43
West Coast Airlines	39,025	6,521	39.78	9,833	4,772	18,307	679,996	48.20
INTERNATIONAL								
Boeing Airways	8,196	19,819	42.59	83,347	—	865,157	9,464,790	43.34
Delta-C & S Air Lines	16,416	13,008	34.77	13,879	—	808,470	1,581,295	46.89
Eastern Air Lines	30,572	53,342	61.99	808,873	893,349	6,918,906	6,918,906	62.25
Norfolk Airlines	80,821	89,393	45.20	8,176,990	30,730	1,430,919	7,044,714	38.05
Pan American World Airways	12,146	12,008	48.76	1,051,491	8,493,878	—	8,493,878	45.16
Alaska Airlines	133,124	176,603	50.78	5,411,816	4,190,009	85,303,423	85,303,423	59.76
Latin American	950,688	202,480	69.81	874,406	7,261,418	30,504,871	30,504,871	67.79
Panama	49,129	141,154	68.85	4,046,116	9,670,125	98,146,068	98,146,068	60.84
Pan American-Guest Airways	34,085	44,606	67.78	118,814	646,440	5,546,836	5,546,836	71.92
Tam World Airlines	39,104	99,969	57.91	1,515,876	9,086,187	14,871,686	14,871,686	99.66
HAWAIIAN CARRIERS								
Honolulu Airlines	91,091	19,691	39.66	9,650	—	348,018	1,446,747	53.43
Tam-Pacific Airlines	42,134	5,308	49.34	3,204	45	85,811	440,005	59.10
CARGO LINES								
Flying Tiger Line	13,049	10,838	88.53	—	—	9,713,363	11,680,827	79.71
Exotic Airlines	—	—	—	—	—	3,798,803	5,793,928	67.93
Stik Airways	—	—	—	—	—	8,806,650	8,896,650	43.95

Compiled by AVIATION WEEK from airline reports in Civil Aeronautics Board



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## Research Is the Key to Airpower Race

The most important reason to emerge from the recent public debate over the rapid rise of Russian airpower is an increasing awareness in Congress and the Pentagon of the importance of basic research and urgent development in the technological area now being run between Russia and the United States. Defense Secretary Charles E. Wilson, with his long aerospace background, still does not understand the salient fact nor does it seem likely, on the basis of his most recent comments, that he will ever fully grasp the overriding importance of basic research as a factor in aeronautical progress.

However, Congress has taken two important actions to support an accelerated aeronautical research and development program.

- Senate Appropriations Committee has restored the \$5.8 million cut by the House for a 10% increase in the National Advisory Committee for Aeronautics program of basic research.

- Senate Appropriations Committee also approved a \$10 million increase in Defense Department research and development and authorized the Secretary of Defense to transfer amounts up to \$300 million from one interdepartmental fund to another, presumably to provide greater flexibility in financing urgent research needs.

Both of these actions in the Senate preceded votes by the House made during the period of Defense Department complacency immediately preceding the Moscow May Day aerial display. It is likely that the House will follow the Senate lead on these two important items now that the full information on recent Russian progress has been made available.

Although Defense Secretary Wilson still dwells publicly that there is no need for an accelerated aeronautical research and development program, there is a growing chorus of military, much of it stemming from responsible officials within the Pentagon. The House Committee Task Force on Research and Development headed by Dr. Minnie Kells, president of the Bell Telephone Laboratories firm, made a notable contribution in pointing out dimensions in which the Pentagon's research program must be improved. Trevor Gardner, Assistant Secretary of the Air Force for Research and Development, and Lt. Gen. Donald L. Pitt, USAF Deputy Chief of Staff for Development, have also voiced sound and constructive criticism in recent speeches reported on page 15.

Both Gardner and General Pitt warned that Russia is making a serious challenge to our present technological superiority in the air and that we must change our outmoded pessimistic attitudes toward this problem of maintaining qualitative superiority. General Pitt emphasized that a significant increase in the basic research effort will be necessary to support an acceptable rate of aeronautical development. Gardner pointed out that we are in the midst of a scientific revolution during which we are trying to make as much progress within the next five years as was made during the first 50 years of aviation.

Whether we can exercise air superiority over the Rus-

sians today is important but it is just as important as the relative rate of technical progress each country is making in the air. For this relative rate of technical progress will determine who will rule the air tomorrow. The vital elements of superior progress in the second of this series cannot be a matter of opinion. How well we run this technical race in the air will determine whether we will remain the masters of airpower or become its victim.

## Light on Tacan Row

An important ray of light has been focused on the Tacan DME air navigation aid controversy by the published report of the Military Operations Subcommittee of the House Government Operations Committee. One of the loudest howls raised by the advocates of DME equipment was the allegation that the Navy and USAF had developed Tacan behind a military security cloak that prevented the DME system from becoming aware that a competitive system was under development. On the final page of the subcommittee report it repeated the full text of a letter dated May 24, 1951, from the then director of the Budget Bureau, F. J. Laetina, to the Secretary of Defense. This letter gave the complete lay to the charge that the Commerce Department and the Civil Aeronautics Administration were working out plans shortly before the 1955 race erupted that Tacan was being developed and would cause serious conflict with their own DME program.

In this letter the budget director warned of the impending conflict between the military tactical aids under development and the CAA civilian aid system, and also the Secretaries of Defense and Commerce jointly to arrange for a thorough reappraisal of the common system and to establish effective co-ordination of the air navigation programs of both departments.

Extremely significant are the following quotations from this letter:

"Final development and service testing of the proposed tactical aids (Tacan) should be accelerated but process must should be deferred until this evaluation has been completed.

"I am also writing the Secretary of Commerce on this matter and asking him to hold back procurement of civil navigation aids (DME) directly affected by the proposed tactical aids."

That it was made crystal clear in writing to both Defense and Commerce Departments in early 1951—four years before the lid blew off this situation facing a congressional investigation—that a major conflict was involved between Tacan and DME. It was clearly stated in 1951 that both parties would be working federal funds in further procurement of either equipment until this controversy was resolved.

CAA and the Commerce Department are equally guilty with the military in the case of needless squandering public funds and using the taxpayer's money to play their own brand of interdepartmental power politics.

—Robert Holtz

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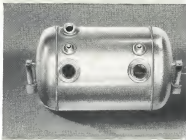
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